Sectional Meetings

Details of the technical section meetings follow. Section name, time and location of meeting, presiding officer, title of paper, and author, address and abstract are listed. See map for building locations.

Business meetings are scheduled for each section. An important item of business is the election of a Membership Chairman for the Section who automatically succeeds to the office of Vice President the following year.

A. ZOOLOGY

MORNING SESSION
Bareis Hall B4
TIMOTHY S. WOOD, Presiding

9:30 THE DISTRIBUTION OF NAIADES IN THE VERMILION RIVER OF NORTH CENTRAL OHIO WITH REFERENCE TO SOME ECOLOGICAL FACTORS. MOLLUSCA: BIVALVIA: UNIONIDAE

Raymond E. Bowers
400 E. Oakland Avenue
Columbus, Ohio 43202

Thirteen species of naiades were collected from the Vermilion River in 1968, 1969, and 1978. There was a sporadic distribution in a variety of habitats. Most naiades were collected from substrates that were a combination of sand and gravel in association with either mud, clay, or bedrock. Higher gradients appear to limit the distribution of some naiades within the Vermilion River, perhaps due to a limitation of the fish-host or the juvenile naiades. The presence of certain naiades in the Vermilion River might best be explained by the drainage patterns during the retreat of the last glaciation, for they have not been reported from Lake Erie.

9:45 AQUATIC GASTROPODS OF THE BASS ISLAND REGION OF WESTERN LAKE ERIE: A HALF CENTURY OF CHANGE. Carol B. Stein, Museum of Zoology, The Ohio State University, 1813 N. High Street, Columbus, OH 43210.

Fourteen collecting stations established in western Lake Erie by C.A. Dennis during the summer of 1927 were re-sampled in 1977, using similar quantitative techniques. Relative population densities of each species at various depths and distances from shore were determined, and are compared with those of 1927. Major alterations of habitat at several sampling sites are related to the faunal changes discovered. On the basis of the data obtained in this study, projections of future changes in Lake Erie gastropod populations are made.

ZOOLOGY

10:00 RELEASE AND SETTLING OF LARVAE IN SELECTED SPECIES OF PLUMATELLID BRYOZOA.
Michael W. Zimmerman and Timothy S. Wood, Department of Biological Sciences, Wright State University, Dayton, Ohio 45435.

The release of sexually produced larvae of freshwater bryozoa occurs in Ohio during the summer months. However, the actual dates and duration of larval production vary among species. Larval production and settling studies were conducted for three species of freshwater plumatellid bryozoa: Hyalinella punctata (Hancock), Plumatella repens L., and Plumatella emarginata Allman. All three species were collected from two artificial lakes in southwestern Ohio. Hyalinella colonies released larvae for 5-6 weeks from early July to late August. Larval production in Plumatella repens occurred throughout June. Plumatella emarginata produced larvae in late summer (August and September) with peak production occurring in the middle of that period. Settling behavior studies were conducted with larvae of Hyalinella and P. emarginata. In both species the larvae responded similarly to light and gravity, demonstrating no phototaxis and a negative geotaxis. Settlement was significantly increased on substrates that had been aged in lake water for at least 24 hours. Hyalinella larvae in general demonstrated a settling preference for substrates of particle sizes larger than 0.5 mm. diameter.

10:15 THE DISTRIBUTION OF CRAYFISH SPECIES IN THE TWO STREAM SYSTEMS OF AN ANCIENT VALLEY IN SOUTHWESTERN OHIO

F. Lee St. John, The Ohio State University, Newark, OH 43055

The crayfish populations of a valley running from Middletown in Butler County to near Hageman in Warren County, Ohio, were studied. The valley, which was once apparently part of the Teays system, is now occupied by two small stream systems, one flowing northwest into the Great Miami River and the other flowing southeast into the Little Miami River. The two stream systems were once connected at their headwaters by a swamp. Five species of crayfish, Orconectes rusticus, O. sloanii, Cambarus d. diogenes, C. ortmanni and C. sp.(ref. see laevis) were found in the valley. In the northern, industrialized part, only O. rusticus is present. Proceeding southeast in the valley species diversity increases. Moreover, the greatest diversity occurs at the edge of the valley. Four of the crayfish species are found in both the northwest and southeast stream systems in the valley. However, O. sloanii is found only in the northwestern flowing system.

10:25 COURTSHIP BEHAVIOR AND REPRODUCTIVE ISOLATION IN A SPECIES OF WOLF SPIDER
Gail Stratton and George Uetz, Dept. of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221

Studies of a new spider species, Schizocosa rovneri Uetz and Dondale, provide an example of how sexual communication functions as a species isolating mechanism. Courtship behavior in this species is distinct from that of Schizocosa ocreata (Hentz), a sibling species with identical genetalia. Sexual communication between males and females is the critical factor in the reproductive isolation of these species. Communication through substratum-coupled stridulation plays a major role.

Courtship behavior of males of both species is described from a film presentation. The auditory communication was recorded by use of a high sensitivity accelerometer vibration pick-up attached to a pre-amplifier, a sound level meter and a tape recorder. Sonograms of these tapes are presented.

A series of experiments was designed to isolate the various components of sexual communication in S. rovneri (visual, olfactory, tactile and auditory). For the male, olfactory and/or tactile cues from the females silk is sufficient to release courtship. Visual stimuli is also sufficient if the female moves. For the female, auditory communication (stridulation of the male palps) is necessary and sufficient to induce receptive behavior.

A forced mating technique using anestization of the female spider allows a test of interfertility. Heterospecific pairings resulted in eggsacs and offspring. It is suggested that differences in courtship behavior serve to maintain reproductive isolation in these two species.

A. ZOOLOGY

AFTERNOON SESSION
Bareis Hall B4
ANDREW WHITE, Presiding

1:30 Business Meeting

2:00 ENZYME CHANGES ASSOCIATED WITH HEPATIC GLYCOGEN METABOLISM IN HYPOPHYSECTOMIZED GOLDFISH. Ralph Paxton and Bruce L. Umminger. Dept. of Biological Sciences, University of Cincinnati, Cincinnati, Ohio 45221

Hypophysectomy of 20°C-acclimated Carassius auratus results in accumulation of hepatic glycogen (172 mg/g of liver) when compared to intact fish (93 mg/g of liver). Total hepatic glycogen synthase activity remains unchanged, while the % of glycogen synthase in the active form is increased in the hypect fish (6.5%) compared to the intact fish (1.2%). Total hepatic glycogen phosphorylase activity and the % in the active form is decreased in the hypect fish (2.62 umoles PO_4/10 min/mg of protein, 74.4%, respectively) in comparison with the intact fish (4.57 umoles PO_4/10min/mg of protein, 83.1%, respectively). The activities of hepatic hexokinase, glucose-6-phosphatase, fructose diphosphatase and and pyruvate kinase remain unchanged, while hepatic glucose-6-phosphate dehydrogenase and phosphofructokinase are both depressed in the hypect fish. Hepatic glycogen accumulation in hypect fish is accompanied by increased glycogenesis, decreased glycogenolysis, decreased pentose phosphate shunt, and decreased glycolysis (as measured by either an increase or decrease in the activity of the regulatory enzyme associated with that particular pathway). The activities of the following muscle enzymes remain unchanged with hypophysectomy: hexokinase, glucose-6-phosphate dehydrogenase, phosphofructokinase, and pyruvate kinase. The activity of fructose diphosphatase is decreased in the hypect fish when compared to the intact fish.

2:15 PARASITES OF THE BRINDLED MADTOM, NOTURUS MIURUS (JORDAN) IN CENTRAL OHIO. Bowen, Charles A. and Crites, John L. U.S. Environmental Protection Agency, 401 M St. SW, Washington, D.C. (TS-769), 20460 and The Ohio State University, Zoology Bldg., 1735 Neil Ave., Columbus, Ohio, 43210.

Three hundred and forty four Brindled madtoms (Noturus miurus) were collected from Salt Creek, Ohio, over a two year period (Oct. 1974 - Sept. 1975; April 1977 - July 1977). The majority (234) of the specimens autopsied were preserved in individual bottles containing a buffered solution of 10% formalin at the time of collection. The remaining 68 madtoms consisted of freshly posted specimens. Parasites collected included one species of monogenetic trematode, two species of digenetic trematodes, one species of cestode, two species of nematodes, one species of hirudinea, and one species of branchiura. Of the eight species recovered seven represent new host records. With the exception of the parasitic cestode, the incidence of parasitic infection was low with only 8% of the madtoms surveyed being parasitized. Cestodes recovered were primarily in the form of encapsulated plerocercoid larvae that infected 89.5% (males = 89.9% and females = 90.0%) of the population. The mean worm burden values were 35.19 (range 18-76) and 28.1 (range 1-59) for male and females respectively.

ZOOLOGY

2:30 OBSERVATIONS ON RAT POPULATIONS IN THE NORTHERN MARSHALL ISLANDS. Manfred Temme and William B. Jackson. Environmental Studies Center, Bowling Green State University, Bowling Green, Ohio 43403.

Rat populations were assessed during a two-month (October-November 1978) survey of seven atolls and two islands as part of a radiation survey in the northern Marshalls conducted and sponsored by the Departments of Energy and Interior. Populations were sampled on 19 islets with snap traps. A total of 814 rats were caught and 780 specimens autopsied. The Polynesian rat (Rattus exulans) was the principal rodent species present on most of the islands. The numbers obtained, by using the same trapping method on all sites, ranged from 3 to 173, representing low to very high population densities. The roof rat (R. rattus) was found only on Likiep islet, Likiep atoll, the only islet where this species was found to live sympatrically with the smaller Polynesian rat. Formerly both species had been found sympatrically on Bikini islet, Bikini atoll; now the roof rat is probably extinct as a result of the cleaning and rehabilitation activities. At Enewetak atoll roof and Polynesian rats live allopatrically. Palatal ridges have been used as a characteristic marker to separate islet rat populations.

2:45 BIRDS OF SENECA COUNTY, OHIO 1947-78 H. THOMAS BARTLETT
CLYDE JUNIOR HIGH SCHOOL CLYDE, OHIO 43410

Seneca County is located in northwest Ohio about 15 miles inland from Sandusky Bay on Lake Erie. It consists mainly of farmlands and a few small woodlots. Major geographic features are the Sandusky River, 200+ farm ponds, one large reservoir, 2 large marshy areas, and several major creeks. The importance ot these areas has been documented.

The records for this paper are based on observations, collections, photographs, and banding records since 1947. There have been 237 species recorded and 104 nesting species. Of these, 101 are considered common(seen on all field trips to correct habitat), 54 uncommon(present but not always seen), 35 occassional(may be seen but not every year or with any regularity), and 47 rare(fewer than 5 records).

Unusual species include a male Kirtland's Warbler-1975; Least Bittern-1968(nested),1978; White-fronted Goose-1968; Golden Eagle-1971,1972; Merlin-1975,1978; Barn Owl-1973(nested); Pileated Woodpecker-2 pr nest regularly; Bewick's Wren-1947; Short-billed Marsh Wren-1976(2+ pr. nested); Worm-eating Warbler-1971; Yellow-throated Warbler-1976,1977; Louisana Waterthrush-1963; Kentucky Warbler-1976; Brewer's Blackbird-1965; and a Summer Tanager-1947.

3:00 PREENING BEHAVIOR OF THE MUTE SWAN, CYGNUS OLOR. Richard A. Rowe, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

Preening behavior of the Mute Swan, Cygnus olor, was observed during the summers of 1976 and 1977 on the Pitchfork Valley Wildfowl Trust in S.W. Michigan. A behavioral classification system for preening was developed from these observations. Preening was found to be a common behavioral response, occurring about 24% of the time during daylight hours. Preening sessions were characterized by three types of movements; the Bill Rub, Nibbling, and use of the uropygial gland. Bill Rubs were found to occur in conjunction with use of the uropygial gland during the first one third of a session, while Nibbling occurred in the later two-thirds of a session. Preening sessions were observed to occur on specific areas, preen sites, located around the ponds. The presence of predictable behavioral patterns within a preening session indicates that preening is a non-random behavior.

3:15 HIND LIMB ABNORMALITIES IN RANA CATESBEIANA FROM AN OHIO POND. Sheryl H. Carls and Robert C. Murray, Department of Biology, Heidelberg College Tiffin, Ohio 44883.

A number of abnormal pre- and postmetamorphic frogs were collected from a small pond near Tiffin, Ohio. Among them were three with a single abnormal hind limb (adactyly-1; meromelia-2) and one with both a meromelic limb and a fractured limb.

The anatomy of these frogs is discussed.

3:30 A RANA CATESBEIANA WITH SUPERNUMERARY LIMBS
Sheryl H. Carls and Robert C. Murray
Department of Biology
Heidelberg College
Tiffin, Ohio 44883

A stage 29 bullfrog tadpole with seven hind legs, six of them functional, was studied. Leg 1 possessed a total of three partial feet with twelve toes. Legs 2 and 3 were a mirror image pair joined by fused ilia which arose from cartilagenous hemipelvises. Legs 4 and 5 presented a similar plan to legs 2 and 3; legs 6 and 7 were also paired, but leg 7 was immovable and greatly reduced in size. Most of the legs showed variable degrees of muscle abnormalities.

The arterial and venous systems to the lower limbs illustrated mirror-imagry, as did the innervations from the sciatic plexus.

B. PLANT SCIENCES

Section B will meet in three concurrent sessions.

FIRST MORNING SESSION
Bareis Hall B103
IRWIN A. UNGAR, Presiding

9:00 THE HYDROGEN ION RESPONSE OF EXCISED PEA STEM SEGMENTS. I. A REEVALUATION OF THE DOSAGE-RESPONSE CURVE OF DARK AND LIGHT GROWN TISSUE AND THE INVOLVEMENT OF CALCIUM IONS. Grant M. Barkley and Leslie A. Hansley. Department of Biological Sciences, Kent State University, 4314 Mahoning Avenue, N.W., Warren, Ohio 44483

The response of excised epicotyl segments of pea (Pisum sativum var. Alaska) to added hydrogen ions (H+) was investigated using a modified transducer 'fast growth' measurement technique. Measurements were performed on columns of 5 or 10 millimeter segments excised from the first internode of etiolated or the second internode of green pea epicotyl tissue and peeled to remove the cuticle and epidermis. Segments of etiolated pea respond rapidly to exogenously added hydrogen ions within the pH range 3.0 to 5.0. A re-evaluation of the kinetics of this response shows the pH optimum to lie between 4.0 and 4.5. In the optimum range the duration of the response is 2.5 to 3 hours compared to 1 or 1.5 hours in the range 3.0 to 3.5. Excised segments from seedlings grown in various calcium concentrations (0.01-0.0001 M) show a marked decrease in responsiveness (43 to 86% reduction) to exogenously added hydrogen ions. Seedlings grown under high calcium concentrations exhibit little or no response to hydrogen ions. Segments excised from seedlings grown under continuous illumination, with or without added calcium, exhibit no increased growth rate in response to hydrogen ions.

9:15 THE HYDROGEN ION RESPONSE OF EXCISED PEA STEM SEGMENTS. II. THE EFFECT OF CALCIUM AND LANTHANUM IONS. Leslie A. Hansley and Grant M. Barkley, Department of Biological Sciences, Kent State University, 4314 Mahoning Avenue, N.W., Warren, Ohio 44483

The measurement of rapid growth changes of excised segments of 'peeled' etiolated pea (Pisum sativum var. Alaska) epicotyl was performed using a modified transducer 'fast growth' technique. Columns of 5 or 10 millimeter segments excised from the first internode of dark grown pea plants respond rapidly (1-3 minutes) to added hydrogen ions (H+). The optimum pH range for this response is between 4.0 and 4.5. Treatment of excised segments in Tris buffered calcium (Ca+2) concentrations (0.01 to 0.0001 M) demonstrates a rapid (1-3 minute) decrease in endogenous growth rates. Pretreatment of segments for 20 to 60 minutes in Tris buffered calcium concentrations also show a reduced ability (60-100% reduction) in response to added hydrogen ions. The effect of Ca+2, after initiation of low pH responses, is also rapid occurring within 1-3 minutes. The effect of lanthanum ions (La+3) on the endogenous growth of segments is similar to Ca+2, causing a rapid reduction in growth rate. Pretreatment with La+3 and subsequent stimulation with hydrogen ions brings about a prolonged latent time (3-6 minutes) and reduced response.

9:30 ROOTING STRUCTURES OF THE CARBONIFEROUS ARBORESCENT LYCOPSIDS. Kathleen B. Pigg and Gar W. Rothwell. Department of Botany, Ohio University, Athens, Ohio 45701

Anatomically preserved specimens of a woody lycopsid showing the transition from the stem to the rooting region have been discovered in coal balls from the Upper Pennsylvanian (Conemaugh Group) Duquesne coal near Steubenville, Ohio. The specimens have bipolar growth and stem regions exhibit exarch protosteles that are apparently medulated at distal levels. The primary xylem is surrounded by a prominent zone of secondary wood. Cortical tissues exhibit expanded leaf bases or leaf cushions, and a distinct zone of periderm. Although features of the stems are comparable to those of the Lepidodendrales, the plants have a rounded, cormose rooting zone, rather than the much branched and elongated stigmarian system that is characteristic of previously known representatives of the order. Specimens of this type expand our knowledge of the diversity among Paleozoic arborescent lycopsids and document the occurrence of representatives with an Isoetes-like base in Pennsylvanian strata.

9:45 THE RELATIVE ROLES OF CHASMOGAMY AND CLEISTOGAMY IN THE REPRODUCTION OF IMPATIENS PALLIDA NUTT. (BALSAMINACEAE). Carmen R. Cid-Benevento. Department of Botany, The Ohio State University, Columbus, Ohio 43210

The apportionment of reproduction into chasmogamous and cleistogamous flowers and seeds was studied in five populations of the annual Impatiens pallida Nutt., located along the Olentangy River in Franklin County, Ohio. Two hundred plants were chosen at random in each population, labeled prior to flowering, and then scored for the number of chasmogamous and cleistogamous flowers and seeds produced weekly. Chasmogamous flowers were collected from thirty two randomly chosen plants in each population and the mean ovule number per flower per plant was determined. Light intensity and plant height were measured and then correlated to the relative production of cleistogamous and chasmogamous flowers per plant at each site. Cleistogamous flowering peaks three weeks later than chasmogamous flowering. The mean number of flowers and of seeds of both flower types and the percentage selfing and outcrossing vary among populations. In addition, the mean seed weight and the seed weight distribution of selfed and outcrossed seed were determined for each population. Little variation in seed weight was observed between the mentioned seed types and among populations.

10:00 SEASONAL OCCURRENCES OF SAPROLEGNIACEOUS FUNGI IN TWO SOUTHEAST OHIO LAKES. Robert W. Martin and Charles E. Miller, Department of Botany, Ohio University, Athens, Ohio 45701.

Seasonal occurrences of Saprolegniaceous fungi in two southeastern Ohio lakes are being studied throughout a 12 month period, commencing July, 1978. Some abiotic ecological factors which might influence the occurrence of water mold fungi in these lakes are also under study. The study areas and collecting sites were visited twice monthly during the first eight months of the study. A total of 512 collections (32 per lake per month) were made. Samples were made using two methods: (1) Water and soil samples collected in sterile 20 ml. containers and (2) by submerging a 20 ml. container for 24 hours, containing sterile hemp seeds (*Cannabis sativa L.*) as a bait. In the laboratory, water samples were placed in sterile petri dishes and baited with sterile hemp seed halves. Water molds were isolated from the half hemp seeds by placing severed hyphal segments on AIM agar (low nutrient) and later by cutting hyphal tips which have grown away from other contaminating microorganisms. Taxonimic determinations are made from isolates grown axenically on hemp seeds in Emerson's water. The following species were identified: *Achlya dubia, A. debaryana, A. prolifera, A. caroliniana, Achlya spp., Saprolegnia litoralis, S. ferax, S. hypogyna, S. diclina, Saprolegnia spp., Dictyuchus sterile, D. monosporous, Aphanomyces laevis, A. spp.,* and *Leptolegnia caudatum.*

10:15 ECOLOGICAL STUDIES OF GROUND HEPATIC FLORA OF THE BEECH FORK RECREATION AREA, WAYNE COUNTY, WEST VIRGINIA. Rufus C. Creekmore, Department of Botany, Ohio University, Athens, Ohio 45701

Ground hepatic flora occurring in the Beech Fork Recreation Area, Wayne County, West Virginia were analyzed for floristic differences and affinities. Collection stations were: a creek bank, north facing slope, south facing slope, wooded flood-plain, wooded ravine, wooded ridge, and a wooded rock outcrop. At each collection station four hundred 400 cm^2 quadrats were sampled within a 100 m^2 sample plot and analyzed by cluster analysis of collection station similarity coefficients. The north facing slope and wooded rock outcrop clustered at a value of 0.714 and displayed the highest degree of similarity in species composition of any of the seven collection stations. The creek bank collection station had the highest percent species coverage and species diversity. Frullania tamarisci (L.) Dum., Conocephalum conicum (L.) Lindb., Lophocolea bidentata (L.) Dum., and Scapania nemorosa (L.) Dum. had the highest percent frequency of occurrence respectively. Twenty species of liverworts were identified constituting seventeen county records.

10:30 THE EFFECTS OF SODIUM ARSENITE AND TEMPERATURE ON MYCELIAL RESPIRATION OF SAPROLEGNIA FERAX. Russell Robbins, Department of Botany, Ohio University, Athens, Ohio 45701

Manometric techniques were utilized in determining the respiration rates of intact mycelia of Saprolegnia ferax (Gruith.) Thuret. in the presence of various concentrations of sodium arsenite. The experiments were conducted at four temperatures 5°, 15°, 25°, and 35°C.

At 25°C, mycelial respiration was significantly inhibited at all concentrations of sodium arsenite. The largest inhibition was recorded at 1000ppm $NaAsO_2$ with over 67% inhibition ($p>0.01$). Respiration was inhibited at sodium arsenite concentrations as low as 0.01ppm ($p>0.05$). At temperatures of 15° and 35°C, respiration was inhibited more than 49% in the presence of 1000ppm $NaAsO_2$ ($p>0.05$). At lower concentrations of arsenic the respiration rates were variable. At 5°C, respiration was not significantly inhibited at any concentration of sodium arsenite.

There was a significant difference in the respiration rates of untreated mycelia at the four temperatures ($p>0.01$). The highest respiration rates were recorded for mycelia tested at 25°C. The lowest rates were shown by mycelia at 5°C.

10:45 AGE SPECIFIC SURVIVORSHIP AND FECUNDITY IN IMPATIENS PALLIDA NUTT. (BALSAMINACEAE). Carmen R. Cid-Benevento and Barbara A. Schaal. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Age specific survivorship and fecundity were studied in five populations of the annual Impatiens pallida Nutt., located along the Olentangy River in Franklin County, Ohio. Six one meter square quadrats were established in each population at the time of seed germination in April, 1978. Plants were censused once a week until all individuals had died in late autumn. Two hundred plants from each population were sampled at random and the number of flowers and seeds produced per week recorded. From these data age specific survivorship and reproductive schedules, reproductive values, intrinsic rates of increase, and net reproductive rates were determined for each population. Environmental factors such as light intensity, edaphic features, and plant species diversity were measured, and then correlated to the demographic variables at each site. Populations differ in age specific survivorship and fecundity. All populations show a Deevy Type I survivorship curve but the distribution of reproduction varies significantly among individuals and populations.

B. PLANT SCIENCES

SECOND MORNING SESSION

Bareis Hall B116

WILLIAM G. SMITH, Presiding

9:00 AGE STRUCTURE OF FRAXINUS PENNSYLVANICUM (OLEACEAE) IN CENTRAL OHIO. Charles N. Horn, Environmental Biology Program, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210

The age structure of Fraxinus pennsylvanicum Marsh was studied in a wooded area on the campus of The Ohio State University, Columbus. A J-shaped distribution curve, in which the number of individuals in the youngest age class is the greatest with an exponential decrease in numbers with age, was hypothesized for the population. The height of small trees and the diameter of large trees at breast height were obtained from a sample of the population, and each measurement was correlated with age. The resultant age distribution curve did not support the hypothesis because the first two age classes had fewer individuals than expected. The deviation is apparently associated with the extremely cold winters during the past two years (1976-77 and 1977-78). A more plausible explanation for the observed phenomen is a cyclic age distribution curve which would develop if these conditions predominated over an extended period of time. This conclusion emphasizes the viewpoint that age distribtution is a valuable tool in understanding the effects of the environment on a species.

9:15 MEIOTIC PROPHASE AND SYNAPTONEMAL COMPLEXES IN SOROSPHAERA VERONICAE (PLASMODIOPHOROMYCETES). Suzanne E. Harris, James P. Braselton, and Charles E. Miller. Department of Botany, Ohio University, Athens, Ohio 45701.

Sorosphaera veronicae Schroeter is an endobiotic, obligate fungal parasite of the shoot system of Veronica persica Poir. The pathological stage of this fungus is a multinucleate plasmodium that eventually cleaves into uninucleate cysts (resting spores). Meiotic prophase, evidenced by the presence of synaptonemal complexes, occurs early in this cleavage stage. The chromosome numbers of S. veronicae and the other plasmodiophoraceous fungi have not been determined conclusively with conventional microscopic techniques because of the minute size of the nuclei (2-4 μm) and the diffuse nature of the chromosomes. The technique of reconstructing synaptonemal complexes using electron micrographs of serial sectioned pachytene nuclei is proving successful in revealing the number of bivalents in S. veronicae.

9:30 UNDERSTORY COMPOSITION IN RELATIONSHIP TO SLOPE POSITION AND EXPOSURE IN AN UNDISTURBED FOREST IN SOUTHEASTERN OHIO. Jay R. Smith and Warren A. Wistendahl. Department of Botany, Ohio University, Athens, Ohio 45701.

A comparison of understory composition on three slope positions (upper, mid, lower) and two exposures (north- and south-facing) was determined in Dysart Woods, Belmont County, Ohio, a mature, undisturbed forest with Quercus alba (White Oak), Fagus grandifolia (American Beech), and Acer saccharum (Sugar Maple) as co-dominants. Sixty 100 m^2 circular plots around randomly located points were used to obtain data on composition, density, diameter size classes, and heights. Comparisons of coefficients of similarity were determined for seedlings (<.3 m tall), saplings (>.3 m tall but <2.5 cm dbh), and trees (≥2.5 cm dbh) on the various sites. Similarity coefficients between slope positions and between exposures based upon species presence-absence showed high values for both seedlings and saplings. Comparisons between lower and upper positions on the south-facing slope based upon seedling density showed 30.89% similarity; mid to upper positions showed 37.61% similarity. Seedling and sapling density between the north- and south-facing slopes showed 38.90% and 53.08% similarity, respectively.

9:45 THE FURTHER CHARACTERIZATION OF SULFATE TRANSPORT AND LOCALIZATION OF SULFATE IN CULTURED TOBACCO CELLS. Susan L. Jones and Ivan K. Smith, Botany Department, Ohio University, Athens, Ohio 45701

The cell culture Nicotiana tabacum L. var Xanthi, XD line, was used in this study. Cells are normally grown on B-5 medium (Gamborg, 1970). The cells exhibit pre-exponential, exponential and stationary stages of growth. High sulfate transport rates are observed during the exponential phase of growth. To investigate factors that may regulate sulfate transport into tobacco cells, the cells were grown on B-5 medium and sulfate deficient B-5. The factors examined were preincubation time prior to transport, preincubation in ± calcium, and preincubation in ± sulfate. In cells grown on B-5, preincubation in calcium for four hours enhanced transport rates in cultures of different ages. Whereas, in the cells grown on sulfate deficient B-5, calcium enhancement and the preincubation time necessary to obtain high transport rates decreased with culture age.

Sulfate transport obeyed Michaelis-Menten kinetics and transport over a wide sulfate concentration range (5μM-5mM) indicated monophasic uptake.

In preparation for sulfate localization, the retention of sulfate within the cells using conventional fixatives was examined. A high retention of sulfate was found using the fixative Ethanol-Acetic Acid (3:1). For localization studies, autoradiography in conjunction with fixation by Ethanol-Acetic Acid or freeze substitution was done.

10:00 FACTORS AFFECTING PLANT ESTABLISHMENT ON AN ABANDONED COAL STRIP MINE. Timothy J. Bell, Botany Department, Ohio University, Athens, Ohio 45701

After approximately thirty years very few plant species have become established on an abandoned coal strip mine near Nelsonville, Ohio. A comparison of the unvegetated areas with the vegetated "islands" reveals that there is little physical difference between the soils of these two portions of the strip mine, however, the soil temperatures can be up to 20° higher on the unvegetated area during the growing season. Leaf litter is virtually nonexistent on the unvegetated areas and seed bank experiments indicate that more seeds are present in the soils of the vegetated areas, where leaf litter is abundant. Seed germination experiments in the field using Panicum clandestinum demonstrate that, although slightly more seeds germinate on the vegetated area, seeds are able to germinate on the soils of the barren area. Transplants of P. clandestinum from the vegetated area to the barren portion of the strip mine survived and set seed. It appears that the seedling stage is the critical stage of development for establishment of plants on the spoil and that the presence of leaf litter is important for establishment of these plants.

10:15 MORPHOLOGICAL AND CHEMICAL ANALYSIS OF A PUTATIVE HYBRID BETWEEN TWO RUSHES, JUNCUS ALPINUS AND J. TORREYI. Mark F. Reinking, Department of Botany, 1735 Neil Avenue, The Ohio State University, Columbus, Ohio, 43210.

In four abandoned limestone quarries of Erie and Ottawa Counties, Ohio, sterile plants that appear to be hybrids between Juncus alpinus and J. torreyi have been discovered. The hybrid nature of the plants was first suggested by morphological analyses. The putative hybrids exhibit intermediacy in several characters including plant height, inflorescence length, number of glomerules per inflorescence, and number of flowers per glomerule.

To elucidate further the nature of the putative hybrid, flavonoid chemistry, enzyme electrophoresis, and chromosomal studies were performed. Both of the parents are diploids, 2n=40; the hybrid is also diploid, 2n=40, but at metaphase I both univalents and unequal bivalents are present. The putative parents share five common flavonoid compounds, but each parent also contains certain diagnostic compounds. In the hybrid, an additive flavonoid profile is obtained with the five common flavonoids as well as the diagnostic compounds of both parents.

Using starch gel electrophoresis, ten enzymes were studied. The putative parents show differences in the allozymes of malic dehydrogenase (MDH), esterase (EST), malic enzyme (ME), and superoxide dismutase (SOD). At those five loci at which the parents differ, the putative hybrids exhibit both of the parental allozymes.

Morphological and chromosomal data, augmented by flavonoid and electrophoretic studies confirm the hypothesis of the hybrid nature of the plants in question.

10:30 A QUANTITATIVE DESCRIPTION OF AN EASTERN HEMLOCK COMMUNITY IN ALABAMA. E. Dennis Hardin, Botany Department, Ohio University, Athens, Ohio 45701

Tsuga canadensis L. (Carr.) (eastern hemlock) is disjunct in northwest Alabama on the Cumberland Plateau where it is found in mesophytic forest communities in gorges on the Pottsville sandstone. The largest, least disturbed gorge is in the Bee Branch Scenic Area of W. B. Bankhead National Forest. At 235 points in the Bee Branch gorge, trees > four cm dbh were sampled by the Random Pairs method, shrubs and saplings were counted in 5 X 5 meter quadrats, and tree seedlings (< 15 cm tall) were counted and cover values for herbaceous canopy species estimated in 1 X 0.5 meter quadrats. Tsuga canadensis and Fagus grandifolia were co-dominant tree species, on the basis of relative frequency, density and dominance, and saplings and seedlings of both species were present in the gorge. Smilax spp., Vitis rotundifolia and Kalmia latifolia had the highest importance values for shrubs and Carex picta and Mitchella repens had the highest importance values in the herbaceous canopy. Species composition and importance values varied between the northern, middle and southern ends of the gorge and between the east and west facing slopes, with T. canadensis having its highest importance values beneath the bluffs, along the stream and in the southern end of the gorge. Moisture content, percent organic matter, pH and texture were determined for 20 soil samples.

10:45 PHYSIOLOGICAL STUDIES OF MECHANICALLY STIMULATED RESPONSE OF THE STIGMAS OF MIMULUS SP. C. Gibson and M.J. Jaffe, Department of Botany, Ohio University

The response to mechanical stimulation of Mimulus sp. is the closure of the stigmatal lobes. The response is complete within 7-12 seconds averaging 1.0 radians in that time. The stigmas must be touched on the adaxial side of the lobes in order for the closure to take place. The response is not dependent on the style. Anthesis lasts for 3 days in which the response is the greatest the first day before the pollen is dehisced. After stimulating, the stigmas will recover to their original position within 40 minutes and are capable of responding to repetitive stimulation. When the stigmas are stimulated and pollinated with their own pollen they do not recover but remain closed. If pollen from unrelated species is applied and then stimulated the stigmas recover normally.

B. PLANT SCIENCES

THIRD MORNING SESSION
Bareis Hall B2
ROBERT L. ROMANS, Presiding

9:00 ONTOGENY OF THE PRIMARY THICKENING MERISTEM IN ATRIPLEX HORTENSIS(CHENOPODIACEAE) Gary L.Yarrow;Dept. of Botany;Ohio State University;Columbus,Ohio 43210

The primary thickening meristem(PTM) in Atriplex hortensis first differentiates in the base of the root just below the root-hypocotyl junction. About 11 days after the appearance of the primary root,a complete ring of stelar cambium has differentiated. Concomitantly the first cells of the PTM differentiate opposite the xylem points. Cells adjacent to these segments of PTM begin to divide and at 13 days a complete cylinder of PTM has differentiated. The PTM then differentiates acropetally in the root and toward the top of the hypocotyl,where by day 24 a complete cylinder of meristematic tissue has differentiated. By approximately day 28,differentiation of the PTM can be seen at the epicotyl base. Here,as well as in the upper transition region,the PTM differentiates between vascular bundles;the cortical parenchyma cells next to the phloem then differentiate into an arch of PTM on both sides of vascular bundles.

The PTM differentiates to within 1.0 to 1.5cm of the stem apex. At 1.5cm from the apex, a single layer of PTM can be seen,but there is no conjunctive tissue. The distance from the root apex to the PTM cylinder has not been determined.

9:15 THE SYSTEMATIC POSITION OF PSALIXOCHLAENA CYLINDRICA, A LOWER PENNSYLVANIAN-AGE FERN. Charles W. Good, Department of Botany, The Ohio State University, Lima, Ohio 45804.

Fertile fronds of Psalixochlaena cylindrica are described from Lower Pennsylvanian-age coal ball specimens collected near Burnley in Lancashire, England. Small stalked sporangia are borne singly on what are believed to be laminar pinnules which are in turn attached to Psalixochlaena foliar axes. Individual sporangia are of the leptosporangiate type with a terminal or lateral annulus and a thin-walled dehiscence zone immediately adjacent to the annulus. Spores are small, trilete, triangular in outline, and correspond to the dispersed spore genus Lophotriletes. To date the genus Psalixochlaena has been classified with the Anachoropidaceae based upon the anatomy of the Psalixochlaena foliar trace. However the Psalixochlaena sporangia and spores reported here are identical to Botryopteris fertile fronds described previously from Lower Pennsylvanian and Mississippean age specimens. Since plants are best classified according to their reproductive structures and not their vegetative features, it seems clear that Psalixochlaena cylindrica should be placed in the Botryopteridaceae.

9:30 A NEW SYNANGIUM OF PRESUMED MEDULLOSAN AFFINITIES. Gene Mapes, Botany Department, Ohio University, Athens, Ohio 45701

Limonitized synangia are reported from the Middle Pennsylvanian (Desmoinesian) Wewoka Formation of southeastern Oklahoma. The anatomically preserved pyriform synangia average 1 cm long and consist of 30 to 50 tubular sporangia immersed proximally in a cellular ground tissue and free distally. Dehiscence is via longitudinal slits. The peripheral sporangia dehisce toward the synangial center; the center sporangia dehisce toward the synangial periphery. The synangia are discussed in terms of current interpretations of medullosan synangial structure.

9:45 A MORPHOLOGICAL AND ULTRASTRUCTURAL STUDY OF FOUR DEVONIAN MEGASPORES. Maihle, N. J. and T. N. Taylor, Department of Botany 1735 Neil Ave., The Ohio State University, Columbus, Ohio 43210.

Unoxidized sporae dispersae specimens of four megaspore genera were picked from Frasnian (Upper Devonian) sediments of the Ocksisporites maclarenii Zone of Canada, and include Hystrichosporites, Lagenicula, Nikitinsporites, and Ocksisporites. Spores were examined utilizing transmitted light, scanning, and transmission electron microscopy. Hystrichosporites and Nikitinsporites superficially resemble one another, possessing raised apical laesurae and grapnel-tipped appendages. Both are readily distinguishable on the basis of spine morphology and by the presence of radial folds on the proximal surface of Hystrichosporites. Two different types of sporoderm organization characterize the two genera. Lagenicula and Ocksisporites both exhibit distinctive palynomorphological characteristics including an unusual distal sculptural pattern in the former, and a sexinal inflation in the latter. The possible functional significance of these structural features is discussed. The sporoderm organization types of all four genera differ and this structural diversity is examined with an emphasis on systematic implications.

10:00 RELATIONSHIPS AMONG UPPER PENNSYLVANIAN COMPRESSED PECOPTERID FOLIAGE. Sara P. Stubblefield. Department of Botany, Ohio University, Athens, Ohio 45701.

In excess of one thousand specimens of compressed plant parts have been collected from the Upper Pennsylvanian Monongahela Group of Athens County, Ohio. The majority of these specimens belong to the form genus Pecopteris and conform to numerous species including P. arborescens, P. cyathea, P. hemitelioides, P. ultraminuta, P. microphylla, P. clintoni, and P. miltoni. Both vegetative and fertile frond segments are present, and some specimens are partially pyritized. A variety of techniques reveal details of gross pinnule morphology, cuticular features, venation patterns, synangial structure, and spore morphology. In most instances, the relationships among the numerous species of Pecopteris described from North America are unclear. These taxa have been proposed primarily for fragmentary specimens showing only small differences in pinnule morphology, and there is little understanding of the range of variation found within a single taxon. The variation exhibited by individual frond segments is compared to the entire spectrum of variation found within the suite of specimens in an attempt to relate the numerous taxonomic species to the biological entities that they represent.

10:15 AN EARLY SEED FERN AXIS WITH LYGINOPTERID FEATURES. Gene Mapes, Botany Department, Ohio University, Athens, Ohio 45701

A well-preserved calcified seed fern stem is reported from the Upper Mississippian Fayetteville Formation of north central Arkansas. The axis is 41.6 cm long and averages 3 cm wide. The stem exhibits an exarch or marginally mesarch protostele with abundant secondary xylem. Leaf arrangement is decussate and petiolar anatomy is Kalymma-type. Structural relationships suggest affinities with the Calamopityeae and the Lyginopteridaceae.

10:30 MORPHOLOGY AND ANATOMY OF ALETHOPTERIS PINNULES FROM THE UPPER PENNSYLVANIAN OF OHIO. James E. Mickle and Gar W. Rothwell. Department of Botany, Ohio University, Athens, Ohio 45701.

Fern-like foliage referable to the genus Alethopteris has been discovered in coal balls of late Pennsylvanian age from near Steubenville, Ohio. Pinnule morphology is described from specimens preserved on coal ball surfaces and is similar to the compression species A. barrulensis Wagner. Morphologically, the pinnules are 0.3-0.5 cm wide and 0.8-1.0 cm long with approximately 40 veins per centimeter of pinnule margin. Individual veins diverge from the midrib at a wide angle and dichotomize once or rarely twice. Anatomically, the specimens show similarities to A. lesquereuxi and A. sullivanti, with an adaxial hypodermis of large cells, a well developed palisade layer, and uniseriate, multicellular hairs on the abaxial surface. Pinnules of this type are structurally similar to those of medullosan seed ferns.

10:45 THE COMPARATIVE POLLEN MORPHOLOGY OF SELECTED NORTH AMERICAN SPECIES OF PEDICULARIS (SCROPHULARIACEAE). Randall G. Cameron and Lazarus Walter Macior, Department of Biology, The University of Akron, Akron Ohio 44325.

Pollens of twenty-two species of the genus Pedicularis (Scrophulariaceae) were observed with light microscopy, scanning electron microscopy, and transmission electron microscopy in an effort to determine their phylogenetic relationships. Six pollen types are recognized on the basis of pollen morphology, viz. tricolpate, syncolpate, circular or angular in polar view, circular or elliptical in equatorial view, arcuate, and scabrate. Evolutionary relationships determined through the study of pollen morphology are related to phylogenetic studies previously constructed in accordance with putative migration patterns, floral morphology and function, fungal associations, leaf morphology, and chromosome number.

B. PLANT SCIENCES

FIRST AFTERNOON SESSION

Bareis Hall B103

RONALD L. STUCKEY, Presiding

1:30 Business Meeting in Bareis Hall B103

1:45 THE TAXONOMY AND ECOLOGY OF SELECTED SPECIES OF CORTICOLOUS MYXOMYCETES

Harold W. Keller, Department of Microbiology and Immunology
Wright State University, Dayton, Ohio 45435

Karl L. Braun, North High School, Springfield, Ohio 45503

Field observations and collections of sporulating corticolous Myxomycetes made over the last ten years indicate that certain taxa are associated with special habitats and substrata and have a definite seasonal and, in some cases, geographic distribution. In Ohio the earliest collection of fructifications on living trees was July 3 and the latest was made on October 12, with most collections being made following heavy rains from late August through September. Corticolous Myxomycetes occur in greatest diversity and abundance on species of living Juniperus, Ulmus, Vitis, and Malus. Specific groups of taxa sporulate strictly on bare bark surfaces of living, healthy trees; others develop on moss-covered areas; still others develop in or around wound sites or on dying, standing or lodged dead trees. Another group is independent of the kind of substratum on which it fruits, and occurs either on living or dead trees. Certain species, the best examples being Arcyria insignis and Metatrichia vesparium, occur strictly on dead trees (normally ground sites). When these two species appear on "living trees and vines," their presence is correlated with the beginning or advanced stages of decay, and thus may serve as a visible indicator of dying trees and vines. Taxa representing examples of these different substrate-related groups will be discussed. Research supported by a grant from the Ohio Biological Survey and grants BMS 75-19098 and DEB 75-19098A-01 from the National Science Foundation.

2:00 A FLORISTIC ANALYSIS OF TWO ABANDONED LIMESTONE QUARRIES ON KELLEYS ISLAND IN LAKE ERIE, OHIO. Mark F. Reinking, Department of Botany, 1735 Neil Avenue, The Ohio State University, Columbus, Ohio 43210.

The limestone quarries on Kelleys Island, abandoned since the mid-1920's, contain distinctively different habitat types: dry, open rock with a thin soil wash; shallow pools that become dry in late summer; deep, permanent pools; mudflats around the edge of pools; steep cliffs along the periphery; piles of debris that have been brought in from the beach. Therefore, the quarries contain a unique assemblage of plants not occurring elsewhere on the Erie Islands. The dominant herbaceous species of the dry rocky habitat are Houstonia nigricans, Panicum lanuginosum, Carex eburnea, Solidago nemoralis, and Senecio pauperculus. The mudflats are characterized by Juncus alpinus, J. torreyi, Eleocharis erythropoda, Scirpus pendulus, Typha angustifolia, and Carex lanuginosa. In the permanent pools, the common submersed species are Potamogeton illinoensis, P. foliosus, Najas minor, and Utricularia vulgaris. In the north quarry, the debris piles account for a very interesting addition to the quarry flora. On these piles are Hibiscus palustris, Sagittaria latifolia, Sparganium eurycarpum, Alisma plantago-aquatica, Amaranthus tuberculatus, Chenopodium album, and Physalis heterophylla.

Those species that persist in the quarries must be able to survive in an open, disturbed, calcareous habitat. Thus, the recent origin of the quarry flora poses an intriguing question. Habitats such as sandy beaches, rocky cliffs, pond mudflats, and calcareous prairies of the island region in western Lake Erie are all possible sources of the quarry's unique flora.

2:15 DISTRIBUTION PATTERNS OF SELECTED AQUATIC AND WETLAND VASCULAR PLANTS IN RELATION TO THE ABANDONED CANALS OF OHIO. Ronald L. Stuckey and Marvin L. Roberts, Department of Botany, The Ohio State University, 1735 Neil Avenue, Columbus 43210

The distributions of a number of aquatic organisms in Ohio show anamalous patterns which may be explained as a result of the operation of the Ohio Canal System constructed between 1825 and 1848. Before their abandonment by 1913, the Ohio-Erie Canal and the Miami-Erie Canal provided an early link between the aquatic biotas of the Mississippi watershed and the St. Lawrence watershed. Observations of the role of canals in changing biogeographic patterns were made by several early Ohio naturalists, particularly Jared P. Kirtland for fishes and naiads. Evidence from historical records, early herbarium specimens, and current distributions show that certain species of aquatic and wetland vascular plants may have been transported by canal. The canals provided appropriate habitats and continuous opportunity for the dispersal of vegetative and sexual propagules of plants across former natural and physical barriers. Distribution maps of selected species, mostly of mudflat habitats, illustrate that certain northern species survive in isolated localities southward in Ohio in the abandoned canals and southern species reach northward in similar sites. At least three patterns are recognizable: (1) Species in western Lake Erie with extensions southward into the Ohio-Erie Canal; (2) Mississippi Embayment species with northward extensions into the Miami-Erie Canal, western Lake Erie, and/or the Scioto Valley; (3) Southeastern species with northward extensions into the Ohio-Erie Canal.

2:30 GENERIC RELATIONSHIPS BETWEEN SALMEA DC. AND SPILANTHES JACQ.(COMPOSITAE: HELIANTHEAE). Robert K. Jansen,* Department of Botany, The Ohio State University, Columbus, Ohio 43210 and Peggy Bolick, Division of Botany, University of Nebraska, Lincoln, Nebraska 68508.

Historically, the two genera Salmea DC. and Spilanthes Jacq.(Compositae: Heliantheae) have been taxonomically confused. This study supports the division of Spilanthes into two genera, namely Spilanthes and Acmella Rich. in Pers. In addition, two species of Salmea, S. caleoides Griseb. and S. glabberima C. Wright, are more accurately placed in Spilanthes. The above rearrangement of these genera is supported by eleven morphological characters including features of the achenes, phyllaries, pales, capitula, and habit. Furthermore, Salmea(n=18 + 2 frag., 32-33, and 32 + 6 B), Spilanthes(n=16), and Acmella (n=13,24,26, and 39) have different chromosome numbers. The present treatment recognizes six species of Spilanthes, seven species of Salmea, and approximately twenty-five species of Acmella. It is concluded that Spilanthes is best placed close to Salmea in the subtribe Verbesininae. Acmella is tentatively considered to be a close relative of Jaegeria H.B.K. in the subtribe Galinsoginae. Spilanthes exhibits its greatest diversity in Cuba, where four species are endemic to the Province of Pinar del Rio. The high percentage of endemism of Cuban Spilanthes is attributed to their geographical isolation on mogotes.

2:45 MORPHOLOGY, CYTOLOGY AND FLAVONOID CHEMISTRY OF MONTANOA SUBGENUS MONTANOA. Vicki A. Funk. Department of Botany, The Ohio State University, Columbus 43210.

Widespread in Latin America, Montanoa Cerv. is distinctive in the Compositae in being a genus of shrubs with white ligules, enveloping pales and no pappus. The genus was described by Cervantes in 1825 and since then over 80 species have been recognized. Montanoa was last revised in 1899 by Robinson and Greenman, at which time it was divided into three subgenera. Of the three, subgenus Montanoa is morphologically distinct. The 14 species of this subgenus share similar fruiting pale structure as well as similar habit, pubescence, achene number, achene dispersal mechanism and capitulum size. They also share similar habitats. Within the subgenus, however, widespread morphological variation and inadequate species circumscriptions combine to make identification of members of this subgenus difficult. Four trips to Mexico and Central America have brought an understanding of the morphological variation which has led to a reduction in the number of species from 14 to 6. All species chromosomally are $n = 19$, and the flavonoid chemistry also is relatively uniform. The morphological distinctness of this subgenus and the flavonoid and chromosomal similarity of the species suggest a very natural group within the genus Montanoa.

3:00 A PALEOLIMNOLOGICAL INVESTIGATION OF ACID STRIP MINE LAKE RECOVERY. Sherilyn C. Fritz and Robert E. Carlson. Department of Biological Sciences, Kent State University, Kent, Ohio. 44242.

Our knowledge of the biotic succession in the recovery of acid strip mine lakes is largely from studies comparing several lakes in various stages of recovery. In this study the recovery of an acid mine lake was determined using paleoecological techniques which provided a continuous record of the changes in the chemical and biological environment during the succession from an acidic to an alkaline state. A sediment core was taken from a 60 year old, recovered acid strip mine lake in Tuscarawas County, Ohio. Sediment density, pH and chemical variables including Al, Fe and Mn were analyzed at centimeter increments throughout the core. Corresponding changes in the diatom density, species composition and community structure are used as indicators of the pattern of biotic recovery. The correlations among biotic and abiotic variables are discussed in relation to recovery.

3:15 REPRODUCTIVE CAPACITY AND SEED SIZE IN LUPINUS TEXENSIS. Barbara A. Schaal. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Ovule and seed production, seed weight, seed and seedling survivorship, and the relationship between seed size and number were studied in a large population of Lupinus texensis located in central Texas and in greenhouse grown plants derived from that population. The average number of ovules produced per plant in the field is much greater than the average number of seeds per plant. On the average, each plant produces approximately 2,000 ovules; of these ovules 2.5% develop into seeds. Of these seeds, one fourth is lost due to abortion and a small amount, 0.3%, is lost due to predation on the plant. Mature seeds from this population exhibit a five fold range in weight, from 10 to 56 mg. The distribution of seed weights in the field population is skewed and leptokurtic. Seed weight is positively correlated with both seed germination and seedling survivorship. Heritability of seed weight is 0.09. There is no correlation between average seed weight per plant and total number of seeds per plant, seeds per pod, or legumes per plant.

3:30 GENETIC VARIATION WITHIN AND BETWEEN POPULATIONS OF DESMODIUM NUDIFLORUM. Barbara A. Schaal and William G. Smith. Department of Botany, The Ohio State University, Columbus, OH 43210 and Department of Biology, Ohio Dominican College, Columbus, OH 43219.

Five populations of Desmodium nudiflorum were assayed for genetic variability in eight enzyme systems representing thirteen genetic loci. The percent polymorphic loci for the species as a whole is 46.2 % , while the percent polymorphic loci within populations is less, 13.5 %. Average individual heterozygosity is low, 2.3 %. D. nudiflorum shows significant differences in gene frequencies between populations. Standardized genetic variances range from 0.053 to 0.280 and mean genetic distances vary from 0.008 to 0.019. Of the total genetic diversity in the species, 47.3 % is accounted for at the between population level and 52.7 % is due to the within population component. Populations show no significant genetic subdivision. Genotypic frequencies within populations and subpopulations do not deviate significantly from Hardy-Weinberg expectations, and F_{IS} values are less than 0.05 and nonsignificant. F_{ST} values within populations vary from 0.001 to 0.02 and are likewise not significant. Genetic diversity within populations is accounted for by differences between individual plants.

3:45 THE REPRODUCTIVE BIOLOGY OF ERYTHRONIUM PROPULLANS GRAY AND SYMPATRIC POPULATIONS OF E. ALBIDUM NUTT. (LILIACEAE). Jo Ann Banks. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Erythronium propullans Gray is a highly restricted species endemic to southeastern Minnesota. Morphologically it appears closest to E. albidum Nutt., which is common and widespread in eastern North America. E. propullans occurs sympatrically with E. albidum, yet rarity of putative hybrids suggests vary little interspecific gene flow. Prezygotic isolation mechanisms include microhabitat preference and pollinator specificity. The primary pollinator of both species was Andrena carlini Ckll. Pollen ovule ratios, protandry, and dimorphic stamens indicate a facultatively outcrossing breeding system for both species. Breeding experiments resulted in neither species producing seed when flowers were emasculated and isolated. While E. albidum is facultatively outcrossing and produces seed when pollinated by E. propullans, E. propullans produces seed in very low quantities only when pollinated by E. albidum. The annual seed crop of E. propullans averages .3 seeds per flower as compared to 5.8 seeds per flower in E. albidum. The scarcity of putative hybrids and low levels of seed production suggest that E. propullans persists almost entirely by vegetative reproduction. The unique lateral runner of E. propullans allows for the production of two new bulbs per individual each year. Preliminary electrophoretic evidence indicates that there is little genetic variation in E. propullans. Lacking the genetic variability required for adaptation to changing environments, the prospects for long-term survival of E. propullans are doubtful.

4:00 THE EPIPHYTIC DIATOM FLORA OF THREE SPECIES OF AQUATIC VASCULAR PLANTS COMMON TO THREE LAKE ERIE MARSHES. David F. Millie, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

The epiphytic diatom flora of Nymphaea tuberosa Paine, Polygonum coccineum Muhl., and Typha angustifolia L. was examined from three marshes located on the south shore of Lake Erie. Samples were collected from the Navarre Unit of the Ottawa Wildlife Refuge, Winous Point Shooting Club, and Moxley's Marsh during the summer and fall of 1977. Periphyton was also collected from artificial substrates (dowling rod) for comparison of colonization. Identification of diatom species were made under oil immersion. Cell densities and community structure of the diatom assemblages were analyzed by use of Simpson's Similarity Index, Coefficient of Community, and analysis of variance among date of collection, substrate types, and geographical location. Temporal periodicity and macrophytic host-epiphyte specificity and interaction in both a qualitative and quantitative nature is discussed.

B. PLANT SCIENCES

SECOND AFTERNOON SESSION

Bareis Hall B116

IVAN K. SMITH, Presiding

1:30 Business Meeting in Bareis Hall B103

1:45 PROMOTION OF LETTUCE SEED GERMINATION BY 9-SUBSTITUTED CYTOKININS.
William J. Pietraface and David F. Blaydes, Department of Biology, West Virginia University, Morgantown, West Virginia 26506

Cytokinins are known to enhance the germination of light-sensitive lettuce seeds. In this study, the activities of the synthetic cytokinin N^6-benzyladenine (bzl^6Ade) and five of its 9-substituted analogs were determined for the promotion of lettuce seed germination. Lettuce seeds (Lactuca sativa cv. Grand Rapids) were first heat treated for 72 hours at 37°C and then sown on filter paper moistened with 4 ml of cytokinin test solution or control solution. Cytokinin concentrations used were 10^{-4}, 10^{-5}, 10^{-6}, and 10^{-7} M. All seeds were incubated at 28± 1°C under total dark conditions. After 48 hours the percentage of germination was recorded. At all concentrations tested, bzl^6Ade and its methyl, methoxymethyl, and tetrahydro-2-pyranyl analogs were found to have promotional effects on germination percentage. The cyclopentyl analog only had promotional activity at 10^{-4} M while the cyclohexyl analog exhibited no promotional activity at any of the experimental concentrations. These results were significant at the 95% confidence level as determined by analysis of variance. A ranking of the activities based on the LSD method of comparison of means will be given as well as possible explanations for these findings.

Supported in part by a Sigma Xi Grant in Aid of Research.

2:00 SEED GERMINATION AND ROOT PARASITISM IN PEDICULARIS FURBISHIAE S. WATS.
Lazarus Walter Macior and Christine E. Wheeler, Department of Biology, University of Akron, Akron, Ohio 44325.

Portions of a collection of 2284 Pedicularis furbishiae seeds made in the Fall of 1977 failed to germinate after being frozen for 45 days, or vernalized by exposure to four 10-day periods at 3°C alternating with four 10-day periods at 18°C, or planted without treatment following a 4-month dormant period. Germination was induced in the frozen (38%), vernalized (39%), and untreated (23%) seed by surface sterilization followed by immersion of the seed in a 2,000 ppm solution of gibberellic acid for 24 hr. Seedlings developed slowly and were chlorotic. When Trifolium incarnatum L. seedlings were grown with those of Pedicularis furbishiae, survival of 486 Pedicularis seedlings after a 20-week growing period was 47% compared with a 12% survival of 817 seedlings grown without Trifolium over the same period. Pedicularis seedlings grown with Trifolium were deep green, grew rapidly, and developed haustorial root attachments to Trifolium roots. Since haustorial attachments were not found on older Pedicularis furbishiae plants in their natural habitat, and since Trifolium incarnatum is not native to this habitat, it is suggested that Pedicularis furbishiae requires parasitic root associations at least in its early stages of development and that this requirement is not host-specific.

2:15 A CHLOROPLAST MEMBRANE PROTEIN REQUIRED FOR THE PHOTOSYNTHETIC OXIDATION OF WATER. Mark B. Spector and G. Douglas Winget, Department of Biological Sciences, University of Cincinnati Cincinnati, Ohio 45221

Almost all of the energy required by living things enters at the level of the photochemical splitting of water in the plant chloroplast. The chemical mechanism by which water molecules are split is not yet understood. We have developed an in vitro assay for photosystem II activity. By incorporating resolved proteins into preformed liposomes, all those redox and photophosphorylation reactions associated with whole chloroplasts were reconstituted. We have used the assay to determine the specific hydrophobic protein required for oxygen evolution. A 65,000 Dalton protein was then isolated that restored oxygen evolution to depleted proteoliposomes. This protein was also prepared from manganese labelled (Mn-54) spinach and was found to contain manganese. Treatment with tris-hydroxymethylaminomethane, hydroxylamine or heat dissociated the manganese from the apoprotein, with concomittant loss of activity.

PLANT SCIENCES

2:30 FACULTATIVE PHOTOHETEROTROPHIC UPTAKE OF ^{3}H-GLUCOSE BY CHLAMYDOMONAS SP. ISOLATED FROM AN ACID STRIP MINE LAKE. Elizabeth L. Buchanan and Robert E. Carlson. Department of Biology, Kent State University, Kent, OH 44242.

Photoheterotrophic uptake of low concentrations (< 10 ug/l) of tritiated glucose by a unialgal culture of Chlamydomonas sp. (Chlorophyceae) isolated from an acid strip mine impoundment was determined under ambient CO_2 concentrations and under CO_2 stress. Using the light bottle-dark bottle uptake method to correct for any bacterial uptake it was found that algae under CO_2 stress take up significant amounts of glucose in the light. Under ambient CO_2 concentrations there was no significant uptake of glucose in the light or dark. The ability of this species to photoassimilate an organic substrate such as glucose, under CO_2 stress, may have adaptive significance to algal populations.

2:45 NUCLEAR CHARACTERISTICS ASSOCIATED WITH CELLULAR DIFFERENTIATION IN SHOOTS OF PISUM SATIVUM L. J. P. Mitchell, Department of Botany, Ohio University, Athens, Ohio 45701

Using a computer-linked cytophotometer to analyze longitudinal sections of Pisum sativum shoots some changing nuclear characteristics associated with cellular differentiation have been documented. Looking separately at cells from the cortex, pith and vascular tissue of the third, fourth and fifth youngest internodes from the shoot apex we have shown that in cortical cells no polyploid cells are evident in the populations measured and there is no obvious change in the distribution of G_1 and G_2 nuclei. In the oldest tissue measured, internode 5, a group of G_1 nuclei with increased volume became apparent and may represent a growing population of mature cortical cells, maturing in G_1. Only in the oldest pith tissue are polyploid nuclei present. The most obvious features of maturing pith are an increase in nuclear volume and a concentration of cells in G_2. The composite data for the vascular tissue are characterized by polyploid nuclei in the youngest internodes measured, together with increased nuclear volume, particularly in the G_2 population. There is no obvious change in the G_1/G_2 ratio although this may well be obscured by the mixed cell types present. Selecting phloem fibers, as a readily identifiable cell type, an increased proportion of these cells were found in G_2 as the internodes matured. A simultaneous analysis of nuclear protein indicated that at least part of the increased nuclear volume, in G_1 or G_2, was due to increased nuclear protein.

3:00 REGULATION OF SULFATE ASSIMILATION IN SUSPENSION CULTURES OF NICOTIANA TABACUM. Ivan K. Smith, Botany Department, Ohio University, Athens, Ohio 45701

The effect of nitrogen and sulfur nutrition on the rate of sulfate transport and extractable activity of O-acetylserine sulfhydrylase (E.C. 4.2.99.8.) was measured. Cells from late log phase cultures were inoculated into either B5 medium (Gamborg, 1970), N-deficient-B5 or S-deficient-B5. No net growth occured in cells transferred to N-deficient-medium. Time-dependent decreases were observed in sulfate transport and O-acetylserine sulfhydrylase activity over the nine day growth period. In contrast, a 13-fold increase in fresh weight occured in cells transferred to B5 medium and an 8-fold increase occured in cells transferred to S-deficient medium in nine days. For 3 days following transfer both groups of cells behaved similarly, namely, sulfate transport was 40 nmoles/g.fr.wt./hr and enzyme activity increased from 100 to 500 µmoles/g.fr.wt./hr. In B5 cells a decline in both activities was observed after 3 days, partially due to expansion of cells and a decline in protein/cell. In contrast, S-deficient cells after 3 days exhibited an increase in sulfate transport to 260 and high enzyme activity was maintained. Addition of sulfate reduced the transport rate more rapidly than cysteine, whereas enzyme activity was more sensitive to cysteine addition. I conclude that sulfate transport is regulated by the intracellular sulfate pool whereas the enzyme is potentially regulated by intracellular cysteine.

3:15 Sporulation of Bipolaris maydis race T is related to the activity of polyphenol-oxidase. M. O. Garraway, R. C. Evans and M. A. Hansen, Department of Plant Pathology, Ohio State University, Columbus, OH 43210. Ohio Agricultural Research and Development Center, Wooster, OH 44691. Department of Biology, Rutgers University, Camden, N. J. 08102.

Sporulation (conidia/g dry w. x 10^6) of Bipolaris maydis race T on a glucose-L-asparagine-mineral salts (GAMS) medium is 73±20 without and 237±20 with a supplement of D(+)-xylose (2.0g/liter), after 7 days incubation in the dark at 28° C. In contrast, the activity (ΔOD/hr/gm dry wt) of polyphenoloxidase (PPO) on each medium is 13±2 and 4±1, respectively. Sporulation increases and PPO decreases with the addition of guaiacol, with increasing glucose concentrations from 2-10g/liter, and with increasing temperatures from 20-28 C. Since PPO from B. maydis is a copper-containing enzyme we are studying the interrelationship between sporulation and PPO with emphasis on the role of copper. On a GAMS medium the increase in sporulation is low in response to increasing concentrations of copper and the increase in PPO is high. In contrast, on a GAMS + xylose medium the increase in sporulation is high in response to copper and the increase in PPO is low. Also this effect is seen with a trace element mixture (Cu^{++}, Fe^{+++}, Mn^{++}, Zn^{++}). The chelating agent EDTA enhances PPO on a medium containing either Cu or trace elements. But significant inhibition of sporulation by EDTA occurs only with trace elements. Thus, the regulatory effect of PPO on sporulation may depend on regulation of the level of other fungal constituents with which the enzyme may interact.

3:30 A FLORISTICS STUDY OF CRANESVILLE SWAMP, PRESTON COUNTY, WEST VIRGINIA AND GARRETT COUNTY, MARYLAND. Roy E. Snyder, The Ohio State University Lima Campus, 4240 Campus Drive, Lima, Ohio 45804

The Cranesville Swamp Nature Sanctuary of West Virginia University, a montane bog that straddles the preston County, West Virginia and Garrett County, Maryland line was established on October 13, 1960 when approximately 259 acres of the swamp area was purchased by the Nature Conservancy. Scientists have explained that during the Ice Age when Canada and the northern United States were covered with the great ice sheet, the northern forest advanced northward to where it exists today. The vicinity of what is now Cranesville, however, a small piece of this vast forest remains as a relic colony. Here, tucked away in the mountains of West Virginia is the southernmost stand of Larix laricinia, Eastern Larch or Tamarack. The plant communities of Cranesville Swamp are representative of stages of bog and forest succession in a climate found many hundreds of miles to the north creating conditions comparable to that of the northern deciduous and boreal forests of North America. The major plant communities present in the swamp and adjoining uplands include the following: Open water - Cattails; Sphagnum-Cranberry; Sedge meadow; choke cherry, blue berry, and St. Johns-wort; Ash-Birch; Red Maple-Wild Black Cherry; and pure stands of Red Spruce and Hemlock forest. In the herbarium of The Ohio State University Lima Campus are mounted specimens of 70 families, 192 genera and 461 species from Cranesville Swamp.

3:45 RECENT RE-DISCOVERIES AND ADDITIONS TO THE FLORA OF PORTAGE COUNTY, OHIO. Barbara K. Andreas. Kent State University, Kent, Ohio. 44240

Portage County, located in Northeastern Ohio, has long been known for its unique diversity of vascular plants. Most came from such well-known localities as the Bird, Frame and Triangle Lake Bogs and the Mantua and Streetsboro fens. In the summer of 1977 and 1978, two additional bog communities were discovered. A bog located in Hiram Twp. has yielded *Rhus vernix, Rhamnus alnifolia, Geum rivale, Habenaria psycodes, Eriophorum viridi-carinatum* and *Drosera rotundifolia*. An abandoned sandstone quarry in Windham Twp. contains a bog-like community containing a solid stand of *Vaccinium macrocarpon* measuring over .5 km in diameter. Growing with the cranberry is *Betula populifolia, Drosera rotundifolia, Lycopodium inundatum, Vaccinium angustifolium, V. corymbosum* and *Gaylussacia baccata*.

Amateur botanists Almon Rood and R.J. Webb collected in Portage County between 1890 and 1921. Many of their collection sites were lost due to incompleteness of information provided on the herbarium label. Rood's "Wadsworth Glen" locality, a northern Hemlock-White Pine-Northern Hardwood community, has been re-discovered within the US Army-owned Ravenna Arsenal. Species located include *Acer spicatum, Viola rotundifolia, Viburnum alnifolium, Lonicera canadensis* and *Thelypteris phegoteris*.

In August, 1978, Rood's 1908 locality for *Aconitum noveboracense*, Ohio's first federal threatened plant, was re-discovered.

4:00 SOME ADDITIONS TO OUR KNOWLEDGE OF THE "PERIPHYTON-AUFWÜCHS" MICROBIOTA OF COAL MINE OUTFALLS IN SOUTHEASTERN OHIO. Arthur H. Blickle, Ohio University, Porter 9, Department of Botany, Athens, Ohio 45701

The so called sterile environments of coal mine outfalls are found to support a plethora of organisms in a neatly organized but complicated productive ecosystem. Algal organisms include the genera Ulothrix, Hormidium, Phacus, Euglena, Cylindrocystis, Eunotia, Synedra, Navicula, Coelastrum, Oöcystis, Mowgeotia and Glenodinium and with many genera compared to the total number of species. Midge larvae, Rotifers and Protozoa are the dominant consumers with the Chironomids present in great numbers in the upper strata of the resulting limonitic deposits of tufa and in the superposed masses of algae.

4:15 RELATIONSHIPS BETWEEN PHOTOTROPISM AND POLAROTROPISM IN THE FILAMENTOUS GAMETOPHYTES OF A MOSS AND OF A FERN, Charles Creutz, Dept. of Biology, University of Toledo, Toledo, Ohio, 43606.

The early stages of development of both moss and fern gametophytes contain a small number of cells growing as a one dimensional filament. It is known that the direction of growth of these filaments is influenced by light. They show a phototropic response growing toward a light stimulus. They also show a polarotropic response, when not allowed to grow toward the stimulus they grow perpendicularly to the direction of polarization of a light stimulus. The studies to be discussed here will be on the control by light on the direction of growth of gametophytes of the moss, Atricum undulatum, and the fern, Onoclea sensibilis. Evidence will be given indicating that phototropism and polarotropism in these systems are separate manifestations of a single underlying physiological mechanism. In both responses it is the direction of polarization of the stimulus that is perceived by the growing tip of the filaments. This information is then used in a negative feedback mechanism to regulate the direction of gametophyte growth. Such a mechanism of perception of light direction during a phototropic response is distinctly different from that used by flowering plants.

C. GEOLOGY

FIRST MORNING SESSION, 9:00 A.M.
Aigler A1
PAUL PUSHKAR, Presiding

9:00 THE THERMAL METAMORPHIC EFFECTS OF A DIABASE SILL: NORTH BERGEN, NEW JERSEY. David R. Polivka, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

A unique example of the effects of contact metamorphism exists at the abandoned Granton Quarry in North Bergen, New Jersey, where the cyclic sediments of the Lockatong Formation (Triassic) are intruded by a subsidiary sill from the Palisades Diabase. The repeated sequences of arkoses, calcareous argillites, and black shales reveal a decreasing thermal-metamorphic effect away from the sill by alteration of the mineral assemblages.

Samples used in this study were taken from the north wall of the quarry where about 70 feet of section was exposed below the contact of the sill. Samples were taken from the bottom, middle and top of each bed to provide representative sample of each rock unit. These metasediments were analyzed using thin-sections, X-ray diffraction, and X-ray fluorescence analysis.

This study provided a comparison of actual mineralogical changes to changes predicted by the equilibrium petrologic-facies concept.

9:10 PILLOW LAVAS FROM THE STEPAFELL SUBGLACIAL VOLCANIC STRUCTURE OF THE REYKJANES PENINSULA OF ICELAND. Robert Amos, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

Samples from Pleistocene pillow lavas were collected from the Stepafell subglacial volcanic hill on the Reykjanes Peninsula of Iceland. The hill stands about 100 meters high, and a quarry exposes an excellent cross-section through the various units studied. Alternating layers of pillows and tuffs suggest that Stepafell was formed under subglacial and interglacial conditions.

In the field it was noticed that large olivine phenocrysts were concentrated near the bottom of each pillow. It seems likely that these phenocrysts already existed at the time of extrusion and began to settle by gravity before the groundmass crystallized.

Samples were collected from the top, middle and bottom sections of several pillows. These samples were analyzed using thin sections and X-ray flourescence analysis. The basalts are olivine tholeiites, a composition which agrees with previous data on the distribution of types of basalts on Iceland.

The temperature of the basalt at the time of extrusion can be determined by viscosity and cooling curves, and the composition of the olivine phenocrysts.

This study presented an unusual opportunity to study non-marine pillow lavas from an active spreading ridge without spillitic alteration that occurs under marine conditions.

9:20 GEOLOGY, PETROLOGY, AND GEOCHEMISTRY OF THE BLACK BUTTE VOLCANIC NECK, GRAVELLY RANGE, MONTANA. Barbara Burke-Griffin and Paul Pushkar, Department of Geology, Wright State University, Dayton, Ohio 45435.

Black Butte is a volcanic neck located in the Gravelly range of southern Montana. The outer walls of the butte stand 1,500 feet high and are composed of basalt showing rough vertical columnar jointing and marked horizontal sheeting. Intruded into the heart of the butte and into the southwestern flank at two locations is a vent breccia made up of reddish bombs and other tephra. A dike of nephelinite is present at the summit. The chemical composition and petrology are typical of alkali olivine basalts and are similar to other such basalts near by.

9:35 GEOLOGY, PETROLOGY, AND GEOCHEMISTRY OF THE BASALTS IN WOLVERINE BASIN, GRAVELLY RANGE, MONTANA. David Eichen and Paul Pushkar, Department of Geology, Wright State University, Dayton, Ohio 45435.

Remnants of an eroded basaltic cover occur in the Wolverine basin. The weathering and morphology of the basalts are very similar to the basalts of the Black Butte plug which have been dated at 22 m.y. The chemistry and petrology are similar to other alkalic basalts in the area such as Black Butte and Snake River basalts. The remnants seem to represent a single flow at least 50 feet thick and have a prominent subhorizontal flow banding. Several localities display vertical flow banding and appear to be feeder vents. Associated with these vent areas are irregular assemblages of nephelinite dikes.

GEOLOGY

9:50 USE OF STRONTIUM ISOTOPES FROM FELDSPAR AS INDICATORS OF PROVENANCE OF LATE WISCONSIN TILL. Karen S. Taylor and Gunter Faure, Department of Geology and Mineralogy, The Ohio State University, Columbus, Ohio 43210.

Detailed systematic till provenance investigation, including grain size analysis, mineralogical compositions, concentrations of Rb and Sr, and $^{87}Sr/^{86}Sr$ ratios of non carbonate fractions, conducted on Late Wisconsin till of the Powell Moraine in Ohio, support the hypothesis that study of strontium isotopes in feldspars is a useful technique for reconstructing ice flow patterns.

The Powell Moraine was deposited by the Scioto sublobe of the Erie lobe, carrying sediment derived from the Grenville Prvince of Canada 1.07 b.y. old, and the Miami sublobe of the Huron lope, carrying sediment from the Superior Province 2.69 b.y. old. The feldspar, concentrated in the -125+250 micrometer fraction, is a mixture of grains derived from these two Precambrian sources. The carbonate concentrations of these fractions increase systematically from less than 1% in the east to over 35% in western Ohio. This is compatible with bedrock lithology and a southwesterly iceflow direction. The ratio of radiogenic ^{87}Sr to ^{87}Rb in the feldspar from this fraction range from .0247 in the east to .0382 in the west. Rb-Sr dates of feldspars are 1.72 ± 0.10 at Galena, Ohio, to 2.64 ± 0.40 b.7. near the Indiana border at Greenville. The dates reflect a mixture of grains from the Superior Province via the Huron lobe and from the Grenville Province, via the Erie lobe. Based on this hypothesis, the feldspar derived from Superior Province increases from $40\pm6\%$ (Galena) to $97\pm25\%$ (Greenville).

10:05 STABILIZATION AND FILLING OF ABANDONDED DEEP COAL MINES IN THE MAHONING VALLEY OF OHIO. Professor Ann G. Harris, Dept. of Geology, Youngstown State University, Youngstown, Ohio 44555

The first mine shaft opened up in the City of Youngstown, Ohio on June 13, 1977, claiming a garage. Since then an additional 13 mines have opened in the tri-county area of Mahoning, Trumbull and Columbiana Counties. On September 6, 1978 the Office of Surface Mining allocated $281,119.00 to stabilize a playground of an elementary school, fill five mine shafts and do test drilling over four shafts which show signs of getting ready to open up.

An additional $200,000.00 was allocated on November 10, 1978 to take an inventory of all existing mines in the tri-county area and classify them as to potential hazards and to produce an atlas with maps and all available information on these abandonded mines.

The program was initiated during the summer of 1978 by drilling 58 holes into the Curtis School playground, which revealed that 60% of the playground is over tunnels and rooms which are three to fifteen feet below the surface. The playground is being stabilized by digging into the entrance and following out the tunnel by digging them out and back filling them in.

The remaining shafts are being test drilled to see how much of the shaft is really open, since they are filled with trash which could be jammed in cross-wise and block the shaft. Then they are being filled with a suitable material which has been determined by the information obtained from the drilling.

10:30 Business Meeting in Aigler A1

C. GEOLOGY

SECOND MORNING SESSION, 9:00 A.M.
Aigler A104
ED ASHWORTH, Presiding

9:00 PEBBLE ORIENTATION AND CROSS BEDDING ANALYSIS OF THE SHARON CONGLOMERATE IN THOMPSON, EAST CLARIDON AND NORTHERN MIDDLEFIELD QUADRANGLES, GEAUGA COUNTY, OHIO. W. Philip Schreiner, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

The Sharon Conglomerate is the basal member of the Pottsville Formation (Pennsylvanian) in northeastern Ohio. The Sharon Conglomerate is a fluvial deposit which contains many indicators of paleocurrent and paleochannel direction. A study of cross bedding and pebble orientation of the Sharon Conglomerate in the Thompson, East Claridon, and northern Middlefield quadrangles, Geauga County, Ohio, indicates a northeastern source of sediment which unconformably overlies three Mississippian shale units.

9:10 THE DIATOM SUCCESSION OF ALDER MARSH, PORTAGE COUNTY, OHIO. Nicholas D. Frankovits, 4380 Darrow Road, Stow, Ohio 44224.

Alder Marsh, located in Portage County, Ohio, was formed within glacial deposits of the Cary stade, Wisconsin age, approximately 21,000 years old. Successional patterns of lake development were interpreted from cores using fossil diatom associations and recent ecological data indicating diatom habitat preference. Three phases of succession were recognized within Alder Marsh. They include: an early shallow, alkaline lake of eutrophic nutrient regime; a shallow, acidic marsh of dystrophic regime; and a lake which is now fluctuating around a mesotrophic regime, possibly due to man's influence from the surrounding area.

9:30 DEPOSITIONAL ENVIRONMENT OF THE ROCKPORT QUARRY FORMATION OF THE NORTHERN PART OF THE SOUTHERN PENINSULA OF MICHIGAN. Robert E. Carter, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

The Middle Devonian Rockport Quarry Formation was studied at its type locality north of Alpena, Michigan. Extensive field and petrographic examinations have led to the recognition of subtidal, intertidal, and supratidal carbonate facies within the formation. The supratidal facies is characterized by non-fossiliferous, laminated, mud-cracked micrite. The intertidal facies is composed of alternating beds of sparsely fossiliferous pelletal limestone and skeletal calcarenite. The subtidal facies is characterized by coral-stomatoporoid boundstone, which is heavily infused with an organic residue consisting primarily of alkanes. The presence of this mature residue is somewhat problematic, for if it resulted from the in situ accumulation of organic matierial, it argues for the existence of a reducing environment during a time of intense organic activity. However, evidence from petrography and insoluble residues suggests that this was the case. It is believed that small changes in sea level could temporarily cut off areas of the active coral-strom community and lead to stagnating conditions, thereby inhibiting life and permitting the accumulation of hydrocarbons. Such fluctuations must have occurred repeatedly during the deposition of this formation.

9:40 LANDFORMS AND SOILS OF WYANDOT COUNTY, OHIO. Joseph R. Steiger, Soil Conservation Service, Box 319, Upper Sandusky, Ohio 43351.

The soil survey of Wyandot County, Ohio by the Soil Conservation Service reveals details of geomorphology. Soil maps were used with topographic maps to delineate these landforms; ground moraine, recessional moraine, kame and eskers, valley train and delta, lacustrine sediments, shorelines, valley dissection, alluvial and organic deposits. Soils were sampled to a depth of 1.5-2.0 meters. Glacial tills on both ground and recessional moraine vary in clay and sand content. Four soils; Bennington, Blount, Nappanee and Celina, reflect this variability. One kame on the Wabash moraine is the highest elevation in Wyandot County. An esker system extends several miles parallel to the Sandusky River. Oshtemo and Belmore soils are common on outwash features including valley trains entering the county from the east. Glacial lake basins are identified by lacustrine sediments, shoreline features and abandoned outlet channels. Paulding, Latty, Del Rey, are extensive soils formed in clayey or silty lacustrine sediments. Tuscola soils formed on the loamy or sandy deposits. Morley soils are present where the Sandusky River and Tymochtee Creek have dissected glacial deposits. Streams have a local base level on dolostone bedrock in several places. Present alluvial deposits are mainly Chagrin soils. Older alluvial terraces have Euclid and Medway soils. Local organic deposits in bogs are Carlisle and Olentangy soils.

9:55 DIPHUICRINUS SOMERSI (WHITFIELD) N. COMB. AND CONTOCRINUS CONSPICUUS (STRIMPLE) N. COMB.; INADUNATE CRINOID TAXA PREVIOUSLY ATTRIBUTED TO GRAFFHAMICRINUS.
J. J. Burke, Cleveland Museum of Natural History, Wade Oval, University Circle, Cleveland, Ohio 44106

Genus Graffhamicrinus recognized herein as valid and distinct from Delocrinus but two species from Allegheny Group, Pennsylvanian, at Carbon Hill, Hocking County, Ohio attributed to Graffhamicrinus by Strimple in 1969 definitely represent other genera. One, Diphuicrinus somersi (Whitfield) n. comb. characterized by: H/W - 0.29; high basal concavity with fairly steep walls; lateral slopes gentle as in D. croneisi; basals only in basal plane; forefacet downsloping, less deep than facetal area, notched at midlength; knife-edge of transverse crest not reaching facet extremities; anal x with single facet; cup ornament nodes and vermicular ridges, huge node on anal x. Minor ornament of all plates granules. Primibrach (E ray) with massive median node, two smaller lateral nodes each side. Three secundibrachs (left ray) also nodose; first quadrangular, following two subcuneate. Second species herewith designated Contocrinus conspicuus (Strimple) n. comb. shows H/W about 0.34, basal concavity strongly impressed, steep walled; basals convex at and in basal plane, tips of radials slightly above plane, cup subround in dorsal view, pentagonal in ventral, low bowl shape in lateral. Radials bear prongs between articular facets. Anal x apparently with single facet. Primibrachs without spines. First primibrach quadrangular. Proximal secundibrachs subcuneate, grading distally to cuneate and eubiserial. Plate ornament scattered nodes; radial prongs granulose.

10:10 SANDSTONE TALUS CAVES OF THE CENTRAL KENTUCKY KARST. Tomislav M. Gracanin. The Ohio State University, Department of Geology and Mineralogy, 125 S. Oval Mall, Columbus, Ohio 43210

Sandstone talus caves are common features of the central Kentucky karst (Mammoth Cave region), Kentucky. They are collapse features, and occur in a narrow stratigraphic horizon near the base of the Big Clifty Sandstone along ridge perimeters. Four key factors influence the formation of talus caves: 1) soluble limestone (the Girkin Formation 2) several impermeable horizons which shed water off ridge tops and concentrate flow at the perimeter; 3) sufficient, but not excessive, flow concentrated at specific points; and 4) local competence of the sandstone. Limestone solution develops voids, generally vertical or migrated shafts, into which unsupported sandstone ceilings collapse. The resulting voids within sandstone, which are sometimes connected to shaft systems below, are known as sandstone talus caves. Talus cave formation is a part of a mass wasting process resulting in erosion and retreat of the sandstone cap. Material collapses into underlying vertical shaft systems, is broken down into cobbles and fine sand, and is moved by subterranean shaft drains and rivers to springs along the Green River. The following general genetic cycle for this process can be identified: 1) initial solution of a void, in limestone; 2) collapse of sandstone into the void; 3) formation of a talus cave; 4) further collapse and subsidence resulting in a sink or depression.

10:30 Business Meeting in Aigler A1

C. GEOLOGY

FIRST AFTERNOON SESSION, 1:30 P.M.

Aigler A1

PAUL PUSHKAR, Presiding

1:30 PARAFFIN DISTRIBUTION ANALYSIS OF SEDIMENTS IN THE CENTRAL AND WESTERN BASINS OF LAKE ERIE. David R. Burris, Department of Geology, The College of Wooster, Wooster Ohio, 44691.

Lake Erie sediments were analyzed for paraffin concentrations to provide an insight into the indigenous and anthroprogenic contributions of paraffins in the Lake Erie benthic environment. Six sediment cores were analyzed. The cores, averaging 60 cm in length, were sectioned into six samples each for a total of 37 samples. The core locations are near the mouths of the Detroit and Maumee Rivers, near Ashtabula, and in the Central Basin.

Samples were extracted using a benzene: methanol Soxhlet extraction procedure. Paraffins were isolated using alumina/silica column chromatography. The isoprenoid compounds pristane and phytane, breakdown products of chlorophyll, were contained in the alkane fraction. The samples were analyzed using glass capillary-gas chromatography.

Paraffin concentrations in the carbon range $n\text{-}C_{15}$ - $n\text{-}C_{31}$ were able to be determined. Glass capillary - gas chromatography provided sufficient resolution to separate the isoprenoid compounds from $n\text{-}C_{17}$ and $n\text{-}C_{18}$. The deeper samples were able to establish a baseline for pre-industrial, indigenous paraffins. Changes in paraffin concentrations caused by land-use changes and petroleum pollution were observed. Different core locations also showed significant differences in paraffin concentrations to give a horizontal as well as a vertical dimension to the study.

1:40 SEASONAL VARIATION OF WESTERN LAKE ERIE BEACH MORPHOLOGY AND SEDIMENT TEXTURAL CHARACTERISTICS. L. James Charlesworth and William L. Kerekgyarto, Department of Geology, The University of Toledo, Toledo, Ohio 43606

Beach profile and sediment textural changes have been measured at Crane Creek State Park, Ohio and Sterling State Park, Michigan on a weekly basis during the period of September 1975 - May 1976. Similarities and differences in erosion and accretion at both sites were related to degree of wave intensity and water level set-up and set-down by wind action. Basically both beaches underwent erosion during the fall and early winter, and accretion during spring. Crane Creek beach maintained a convex-upward profile and had a net accretion of +24 ft^3/ft width of profile. The slightly convex-upward profile of Sterling State Park beach flattened during the spring accretion period due to landward migration of a nearshore ridge which filled in the runnel and welded to the foreshore. Although there was accretion during the spring there was a net loss of sand of -34 ft^3/ft width of profile. Sediment mean grain size (M_z) and sorting (σ_I) characteristics were closely related to beach morphology and underwent weekly and seasonal changes. In general, during the fall and winter M_z and σ_I of backshore sediments varied little at either site while berm crest, foreshore and breaker zone sediments changed in a like manner. During the spring changes in M_z and σ_I for foreshore and breaker zone sediments were opposite berm crest sediments. These textural variations reflect readjustment of beach morphology to rising lake level and lower wave energy conditions.

1:55 THE USE OF BROMIDE FOR STREAM DISCHARGE MEASUREMENTS. Huntsman, Brent E., Hydrogeologist, Assistant to the Director, Brehm Environmental Laboratory, Wright State University, Dayton, Ohio, 45435, and Schultheis, Ernest J., Environmental Studies, Wright State University, Dayton, Ohio, 45435

An alternative to mechanical stream flow measurements is the utilization of chemical dilution techniques. This involves the addition of a concentrated chemical solution to a stream and, after complete mixing, determining the amount of dilution at a downstream sampling site. Chemical tracers have included salts of sodium and potassium, organic dyes such as fluorescein and rhodamine, and radioactive isotopes of iodine and hydrogen. Depending upon the tracer, downstream detection is accomplished by electrical conductivity, chemical analysis, colorimetry or fluorometry, and radiometric measurements. Recent research has indicated that use of the bromide ion (Br^-) is readily detectable in the microgram per liter range in natural waters using commercially available ion-selective electrodes. Bromide content of natural waters is negligible and, once introduced into a stream, displays little absorption on suspended or bed materials; a prerequisite of an ideal tracer. Discharge measurements made with chemical dilution techniques employing bromide have compared favorably with mechanical and stage discharge flow methods. In addition, bromide flow measurements are amenable to a variety of flow regimes, easily conducted on site, relatively inexpensive, and are environmentally safe.

GEOLOGY

2:10 THE GROUND-WATER RESOURCES OF PICKAWAY COUNTY, OHIO. Richard C. Bain. Ohio State University, Department of Geology and Mineralogy, 125 S. Oval Mall, Columbus, Ohio 43210

During the twenty years since the ground-water availability of the Scioto basin was mapped by the Ohio Division of Water, more than 3,000 new wells have been drilled in Pickaway County, thus enabling a more detailed understanding of the county's ground-water resources. Wells drilled in the western third of the county can produce between 100 and 500 gallons per minute (gpm) from the Silurian and Devonian limestones underlying the drift. Wells developed in sand and gravel outwash in the central third of the county can yield at least 500 gpm, and as much as 1000 gpm when drilled near major streams. Wells in the eastern third of the county are developed in Devonian and Mississippian shales and sandstones or the relatively thin overlying drift and produce no more than 25 gpm, and quite often only 1 to 2 gpm.

Water samples collected from various points in the county were analyzed by atomic absorption and wet chemical methods. Median values of nine chemical-quality parameters for ground water from the western, central, and eastern parts of the county, respectively, are as follows: Hardness: 600, 300, 400; Dissolved Solids: 700, 450, 450; Sulfate: 200, 70, 60; Chloride: 8, 20, 20; Calcium: 120, 100, 100; Magnesium: 50, 40, 40; Sodium: 30, 10, 15; Potassium: 4, 2, 4; Iron: 1.5, 2.0, 1.5.

2:25 SEISMIC REFLECTION PROFILES AND VIBRACORES IN THE SOUTHWESTERN (OHIO) PORTION OF LAKE ERIE, PRELIMINARY FINDINGS: Charles H. Carter and Jonathan A. Fuller, Ohio Division of Geological Survey, POB 650, Sandusky, Ohio 44870.

In 1977 the Ohio Geological Survey, in cooperation with the U.S. Army Coastal Engineering Research Center traversed 660 km along the entire Ohio shore (270 km) of Lake Erie with a seismic reflection Uniboomer. The seismic records, which were taken within 15 km of the shore, show prominent shallow reflectors, commonly a few to several meters below the lake bottom, along most of the traverse. In 1978, 58 vibracores (6.1 m maximum length) were taken along the seismic lines. Examination of the cores shows that the shallowest reflectors correspond to marked lithologic differences in the underlying Pleistocene and Holocene sediments. In general, the cores consist largely of fine grained deposits (silts, clays, and muds). However, at three areas (Fairport Harbor, Lorain-Vermilion, and Cedar Point) there are appreciable thicknesses (a few meters) of coarse grained deposits (sands and gravels). The facies include interlaminated, interbedded, and/or turbated gravels, sands, silts, and clays; plant detritus and abundant and diverse molluscan fauna are common in some zones. The facies appear to represent a number of glacial, periglacial, and postglacial depositional environments.

2:50 A SEISMIC REFRACTION STUDY OF A BURIED VALLEY NEAR PENINSULA, OHIO

Mark Mangun 300 Spicer St. Akron, Ohio 44304

A structural contour map of the bedrock surface was constructed from seismic refraction and well log data. The refraction study utilized a six channel Bison seismic unit with a seismic source consisting of a weight drop unit constructed for the study. The results agree with the general outline of the buried valley as determined by Smith and White (1953), however, a narrower valley floor is indicated. Inferences from the seismic data were made as to the bedrock type and to the nature of the glacial fill based on the corresponding seismic velocities. The data is generally statistically significant for the area except in several locations where problems were encountered in interpreting the proper waveforms in the field.

3:10 GEOLOGY OF OHIO STATE PARKS. F. W. Cropp, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

In Ohio there are 65 state parks located in 54 of Ohio's 88 counties. A search of the literature revealed that there are no publications specifically about the geology of more than 50 of the parks. Only a few parks--Hocking Hills, Kelleys Island, Nelson-Kennedy Ledges, and South Bass Island--have had a number of publications written specifically about their geology, although most parks are referred to in various field trip guides, regional studies and county or sectional geology reports. Senior Independent Study Theses at The College of Wooster are being completed about the geology of Catawba Island, Crane Creek, East Harbor, Kelleys Island, Mohican, and South Bass Island State Parks, and during the next five years theses will be written about most of the other state parks. There are plans for publications about the geology of the state parks to make geological information available to the increasing number of visitors to these areas.

3:20 THE STRATIGRAPHY, GEOLOGIC HISTORY, AND DEPOSITIONAL ENVIRONMENT OF THE OLIGOCENE CASTLE ROCK CONGLOMERATE, DOUGLAS, ELBERT, AND EL PASO COUNTIES, COLORADO. Robert K. Morse, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

Paleocurrent, stratigraphic, lithologic studies were initiated in order to determine the environment of deposition of the Castle Rock Conglomerate. This deposit outcrops in a 65 kilometer wide band near the town of Castle Rock, Colorado, about halfway between Denver and Colorado Springs.

Field study and subsequent laboratory analysis revealed that this deposit is a poorly sorted, arkosic, boulder conglomerate. Granite, quartz, granite gneiss, and feldspar cobbles predominate, with rhyolite boulders of local provenance also occurring. Extensive strike and dip measurements of cross-bedding were taken and statistically analyzed for paleoslope direction.

Deposition occurred in a braided stream environment within a restricted valley, with coarse deposits of possibly alluvial fan origin as supply. Rhyolite occurred locally as a talus deposit, thus enhancing the extremely coarse nature of the formation. Late diagenetic cementation with opaline silica occurred as groundwater descended from overlying volcanic ash deposits.

3:35 DEPOSITIONAL ENVIRONMENTS OF THE CUYAHOGA AND LOGAN FORMATIONS (LOWER MISSISSIPPIAN) IN CENTRAL OHIO. K. B. Bork and R. J. Malcuit, Dept. of Geol. & Geog., Denison Univ., Granville, Ohio 43023

Stratigraphic relations, vertical sequences, sedimentary structures, grain-size parameters, and faunal associations have been studied in order to arrive at a model of deposition for the Cuyahoga and Logan Formations (Lower Mississippian) of central Ohio. It is concluded that the initial environment of deposition for the Cuyahoga Shale was a prodelta zone or basin. Progradation occurred, with the result that some upper Cuyahoga silty units contain a nearshore molluscan fauna characterized by Palaeoneilo. Continued progradation gave rise to lobes of coarse clastic deposits, the Black Hand Sandstone, representative of distributary mouth bar and barrier bar environments. At a few outcrops the upper Black Hand contains a moderately diverse marine fauna. Logan sedimentation began with the distribution of the Berne Conglomerate, a thin but widespread unit interpreted to be the product, in part, of storm-related reworking of the underlying Black Hand. Subsequently the Byer Sandstone was deposited as transgressive sand sheets in shallow marine water. The Byer sea hosted a diverse fauna of pelmatozoans, fenestrates, bivalve molluscs, and abundant syringothyrid, spiriferid, and rhynchonellid brachiopods. An incursion of coarse clastics, combined with slight lowering of sea level, generated the Allensville Member. Sea-level rise led to conditions similar to those which existed during deposition of the Byer; the Vinton Member is the result.

GEOLOGY

STRATIGRAPHY OF MULTIPLE TILL EXPOSURES IN NORTHAMPTON TOWNSHIP, SUMMIT COUNTY, OHIO. John P. Szabo, Department of Geology, University of Akron, Akron, OH 44325.

3:50

Several exposures along the valleys of Mud Brook and its tributaries in Northampton Township exhibit multiple tills. One gravel pit possibly displays four tills separated by silts, sands, and gravels. The upper two tills are clay-rich and texturally similar to each other. These tills are separated by .1 - 1m of leached silt and overlie sand and gravel. The two tills are exposed again in an abandoned pit 1.5 km to the north. An ablational phase of the uppermost till is draped over a terrace 1 km to the west and overlies deltaic silts and sands. The third till underlies sand and gravel and is siltier than the upper two tills. Deltaic deposits overlie the lowermost till which is more pebbly, sandier, and more heavily iron stained than the other tills. Forty feet of till crops out across from bedrock 1.5 km eastward along Mud Brook and tentatively correlates to the lowermost till in the main exposure.

REPORT ON INQUA 1977, A GLACIAL GEOLOGIST SEES BRITAIN. Jane L. Forsyth, Department of Geology, Bowling Green State University, Bowling Green, Ohio 43403.

4:10

INQUA, the International Quaternary Organization, had its Xth meeting in England in August 1977, so it is high time that some report of this meeting be given to Ohio's geologic community. Participants from Ohio included Dick Goldthwait, George Crowl, Paul Colinvaux, and myself. The main meetings, at which many professional papers were presented in 6 concurrent sessions for a week, were at the University of Birmingham. The papers were generally profitable and challenging, and the opportunity to meet other Pleistocene workers from all over the world was rewarding and deeply satisfying. Many field trips were offered, both before and after the Birmingham sessions, which incorporated, in an exciting way, all aspects of the Pleistocene -- geology, paleobiology, early human history, and climatology -- and also provided us foreigners with a fine chance to see Britain.

My pre-Congress trip was to the Northern Highlands of Scotland, led ably and charmingly by Chalmers Clapperton of Aberdeen, where we saw late Devensian (Wisconsin)glacial features created by ice flow from local British centers, plus beautiful mountains in an unprecedented week of continuously sunny days. My post-Congress trip, effectively led by John Catt of Rothamsted Station, was to Yorkshire, just inside the Devensian border, where the glacial deposits and stratigraphy seemed very like those of Ohio, but where soils are not yet generally used as a tool (hopefully my comments during the trip may help this). Slides from Yorkshire and Scotland will illustrate the talk.

MINERALOGICAL INVESTIGATIONS RELATED TO THE ORIGIN OF MASSIVE SULFIDE DEPOSITS
David E. Hay, College of Wooster, Wooster, Ohio 44691

4:20

The origin of Fe-Cu massive sulfides, long a topic of controversy, is now receiving new interpretation related to plate tectonic theory. These mineralogically simple, lenticular shaped ore bodies are now recognized as having a close genetic relationship to volcanism with deposition either near or at the ocean bottom interface. Three major types of massive sulfides are recognized and these could represent three different tectonic environments. Mineralogical characteristics and zonation differences between these types are dependent upon the chemical evolution of the hydrothermal ore solutions generated in these tectonic environments. The resultant solution is the result of sea-water being driven convectively by heat and reacting with particular associated volcanics, modified by some juvenile fluids.

Mineralogical and petrological investigation of massive sulfide ores has been conducted to evaluate that the mineral assembledges are consistent with the syngenetic tectonic environment postulated for massive sulfide deposits. The major deposits of Rio Tinto, Spain and those of Cyprus will be discussed.

4:30 A MODERN STREAM TERRACE IN OHIO
G. H. Crowl, Ohio Wesleyan University, Delaware, Oh 43015

A terrace on an east-bank tributary of Alum Creek, Delaware County, Ohio, records a period of alluviation after the last Wisconsinan glaciation and a period of downcutting and terrace formation coincident with clearing and settlement in the area about 1810-20. The date for downcutting is provided by extrapolating from a ring count on a white oak tree on the terrace.

4:45 GEOMORPHOLOGY OF A PALEO-SHORELINE IN VIRGINIA. Mark D. Zeigler, Department of Geology, College of Wooster, Wooster, Ohio 44691.

There is a direct correlation between fluctuations of sea level, attributed largely to glacial-eustatic effects, and the formation of paleo-shorelines along the Atlantic Coastal Plain of the United States.

East of the fall line there are many post-Miocene ocean-cut scarps which tend to run parallel to the coast. One of these prominent scarps is the Suffolk Scarp. It can be traced from Maryland to North Carolina, and perhaps further north and south, but nomenclature problems exist. The toe of the Suffolk Scarp is 20 to 30 feet above sea level. The height of the scarp varies between 15 and 50 feet. The Suffolk Scarp was cut during later stages of sea level rise from Illinoian to Sangamon. During the Sangamon a paleo-equilibrium profile of the Suffolk shoreline existed due to the prolonged still stand of sea level.

A segment of the Suffolk Scarp in Gloucester County, Virginia, and pertinent surrounding area was investigated. Field work shows the presence of a paleo-sand shoal perhaps six miles in length and three in width north of the York River. Field work also reveals that the Suffolk fastland provided material from which the shoal was formed by littoral drifting from the north along the Suffolk strandline. North of the paleo-sand shoal seaward from the scarp the material is finer grained sandy-silty-clays. This study reveals that modern coastal processes are applicable to the study of ancient shorelines.

C. GEOLOGY

SECOND AFTERNOON SESSION:

Joint Symposium by the National Association of Geology Teachers and Sections C. Geology and H. Science Education of the Academy

Aigler A104

RUSSELL O. UTGARD, Presiding

1:30 GOVERNMENT REGULATIONS AND THE TRAINING OF GEOLOGISTS, Moderated by Russell O. Utgard, Associate Professor, Department of Geology and Mineralogy, Arranged by Victor J. Mayer, Professor of Science and Mathematics Education, The Ohio State University, 283 Arps Hall, 1945 North High Street, Columbus, OH 43210.

Over the past decade, the implementation of government regulations in mining, waste disposal and land use has had a large but often unrecognized impact upon the practice of geology. Geologists, just entering the profession are seldom prepared to recognize this impact and the effect it will have upon their work. This symposium will address these questions: What are the various government regulations that geologists practicing in the midwest must understand? How can information relating to governmental regulations be incorporated into geology curricula?

The symposium will consist of three presentations and a panel discussion. The presentations will be by recognized experts in surface and underground mining, water quality, coastal zone management and disposal of hazardous waste material. Each will explain the various government regulations that pertain to the practice of geology. The panel discussion will focus on geology curricula and how they can better prepare students to understand governmental regulations and their impact on geological practice.

D. MEDICAL SCIENCES

MORNING SESSION

Beeghly Library A-V Room

DELMAS ALLEN, Presiding

8:00 MITOCHONDRIAL INNER MEMBRANE ALTERATIONS IN THE RaVe LYMPHOBLASTIC LYMPHOMA. Bambeck, G. S., Heath, R. T. and Gesinski, R. M. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Mitochondria isolated from RaVe Lymphoblastic Lymphoma implanted into DBA/1J mice differ both structurally and functionally from mitochondria isolated from liver, heart, muscle and kidney of this mouse strain. Tumor mitochondria consume oxygen 3-17 times slower than the mitochondria from other tissues tested. Major peptide composition of whole mitochondria (determined by SDS-PAGE) showed that tumor mitochondria contain a unique 19000 D peptide and lack an 88000 D peptide found in mitochondria of the other tissues. Liver and tumor mitochondria were further fractionated into outer membrane (OM), inner membrane (IM) and matrix. Specific activities of enzyme markers were used to determine purity of isolates. The 88000 D peptide was observed only in the liver IM fraction while the 19000 D peptide was observed only in the tumor IM fraction. The OM marker (monoamine oxidase activity) was absent in tumor mitochondria, although tumor OM gels resembled liver OM gels. We hypothesize these structural differences are responsible for the observed functional alteration.

8:15 PLASMA LEVELS OF DEOXYCORTICOSTERONE DURING A GRANULOMATOUS INFLAMMATORY RESPONSE IN THE RAT. Charles E. McBride, Jr. and J. Ross Stevenson, Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Blood samples were taken at specific time intervals from rats which had a granulomatous inflammatory response to injected croton oil and the plasma levels of deoxycorticosterone (DOC) were measured by radioimmunoassay. A drop in plasma level of DOC was seen from 24 hours to seven days after the initiation of the inflammation. Nine days after the start of the inflammation the plasma level of DOC returned to control level and remained there through healing of the inflammation. These results can be interpreted in terms of the pro-inflammatory effects of DOC discovered by Selye in the 1940's and 1950's.

8:30 SERUM PROTEIN DIFFERENCES IN HYBRID MICE ACCEPTING AND REJECTING RaVe LYMPHOBLASTIC LYMPHOMA. Hazlip, J. R., Bambeck, G. S. and Gesinski, R. M. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Previous research in our laboratory has shown that RaVe lymphoblastic lymphoma implanted into DBA/1J kills all mice in 8-12 days. When this tumor is implanted into C57BL/6J the tumor is rejected and all mice live. F1 hybrid (C57BL/6J X DBA/1J) have a 100 percent acceptance of the tumor and die in 8-12 days. Only 25 percent of the F2 generation demonstrate a histocompatibility for the tumor and die. The other 75 percent of the F2 reject the implant and survive.
Polyacrylamide gel electrophoresis of pH 5.8 precipitable serum proteins showed qualitative differences between those F2 mice which accept the tumor and those which reject implanted tumor. Analysis of our gels indicates that these differences occur in the low molecular weight protein range. The mice which reject the tumor and survive have this low molecular weight protein. Histocompatible mice, those which accept the tumor and die, are lacking this low molecular weight protein species.

8:45 ANTI-NEOPLASTIC STUDY OF D-ISOASCORBIC ACID, BETAINE HYDRATE, AND A COMBINATION OF THE TWO ON THE GROWTH OF SOLID TUMOR IN MICE. John F. Freidel, Yoshiki Tsuchiya, Leo G. Nutini. St. Thomas Institute, 1842 Madison Road, Cincinnati, OH 45206.

It had been previously demonstrated in our laboratories that a combination of D-isoascorbic acid and betaine hydrate had selective mitotic inhibitory action on mouse neoplastic cells as compared to no activity or stimulation of normal tissue cell mitosis in tissue culture.

The present investigations were a continuation of this work into the animal field. Three animal tumors were studied. Ehrlich's carcinoma, Sarcoma 37 and the dbrB adenocarcinoma; the first two in both their ascites and solid form, the latter only in the solid form. Negative results were obtained with the tumors in their intraperitoneal ascites form, but with the solid tumors multiple administration of a combination of D-isoascorbic acid and betaine hydrate significantly inhibited the growth of all three tumors. It was further indicated that administration of the two materials in combination was more effective than when either was given alone; sometimes as much as 30-40%.

9:00 MORPHOLOGICAL AND FUNCTIONAL EFFECTS OF BROMOSULFOPHTHALEIN UPON S37 ASCITES TUMOR CELLS. Teresa K. Huff, Abramo Ottolenghi, and Richard H. Matthews, Dept. Physiological Chemistry, 333 W. 10th Ave., Columbus, Ohio 43210.

Earlier studies suggested the possible involvement of the γ-glutamyl cycle in support of amino acid transport into the S37 cell. Another laboratory reported that bromosulfophthalein, BSP, was a specific inhibitor of γ-glutamyl transpeptidase, a key enzyme in the cycle. We therefore examined the effects of BSP on S37 cells. Incubation of S37 cells with 1 mM BSP did indeed cause marked inhibition of amino acid transport systems A and L. However, some of our cell preparations assumed an unusual gel appearance. Examination under phase-contrast microscopy revealed a progressive disintegration of cellular membranes in the presence of 1 mM BSP. A series of more general functional tests, including sulfate exclusion, vital stain exclusion, and ^{51}Cr release also indicated alterations in functional properties of plasma membranes of S37 cells in the presence of 0.5 mM or 1 mM BSP. Membrane alterations in the presence of BSP were also observed using electron microscopy. It would appear that BSP exerts a general detergency effect upon the plasma membrane of S37 cells. (Supported by NIH grant CA17925).

9:15 THE USE OF BUSULPHAN AS A PROBE IN DETERMINING SOME PARAMETERS IN THE RaVe LYMPHOBLASTIC LYMPHOMA TUMOR. Gesinski, Raymond M. and Kosisko, Pamela A. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Busulphan (Myleran ®) is considered primarily as an inhibitor of granulocyte production. It does in general, however, have immature cells for its target. In addition, busulphan causes inhibition of antibody formation if given 2-4 days before antigen administration.

Mature DBA/1J mice 3-6 months of age were administered 15 mg/kg busulphan, and longitudinal blood studies were performed. Typically, as reported in the literature, the WBC count decreased gradually for 9 days and then began to increase. Mice implanted with the tumor showed an increase in WBC up to the 9 day, then a decrease to the 12 day when mice died. A third group of mice were administered busulphan and tumor implanted 2 days later. Longitudinal blood counts demonstrated a decrease in total number of WBC, but the overall profile shadowed the tumor implant profile - and mice died on the 12 day.

Although it appears that the busulphan has attacked some of the immature blast forms and attenuated the total WBC, the busulphan did not temporally alter the fatal course of the implanted tumor. Nor does it appear that the mice mount any antibody response to the implanted tumor.

9:30 NORMAL/TRANSLOCATION TRISOMY 21 MOSAICISM IN TWO SONS OF A NONMOSAIC TRANSLOCATION CARRIER FATHER. K. K. Kessler, C. B. Kennedy, D. R. Hull, C. L. Valido and R. C. Juberg. Children's Medical Center and Wright State University School of Medicine, Dayton, Ohio 45404.

The 4-month-old proband was ascertained because of cardiac murmur, delayed development, growth retardation, flattened occiput, bilateral epicanthus, synophrys, short nose, protruding tongue, bilateral 5th clinodactyly, and hypotonia. Karyotype from blood was 46,XY/46,XY,-12,+t(12;21)(12pter→12q24.3::21q21→qter) with 50:50 ratio.

His only sibling was a 3 7/12-year-old brother with delayed development, indistinct speech, flattened facies, mongoloid palpebral fissures, bilateral epicanthus, blepharitis, Brushfield spots, synophrys, flattened nasal bridge, large mouth, and increased space between toes 1 and 2. Karyotype from blood was the same as his brother but with a 75 normal:25 translocation ratio.

The father, a computer programmer, was phenotypically normal except for a fluency disorder. Karyotype from blood was 45,XY,-12,-21,+t(12;21)(12pter→12q24.3::21q21→21qter). His parents were karyotypically normal. His only siblings, 2 brothers, were phenotypically normal. The mother was karyotypically normal.

A similar 12;21 translocation has not previously been reported. The occurrence of an apparently normal cell line arising from the trisomic translocation is rare. We suggest that the translocation was transmitted in each conception and that the normal cell line arose at an early division or that the translocation may be temporally unstable.

9:45 DEMOGRAPHIC FACTOR AFFECTING EXCLUSION RATES IN PATERNITY STUDIES. John W. King and Geneva E. Cylar. Cleveland Clinic, 9500 Euclid Ave., Cleveland, Ohio 44106.

A review of 1500 consecutive paternity exclusion studies carried out at this hospital between 1955 and 1978 indicates an overall exclusion rate of 12 percent. The theoretical exclusion rate for the studies done is calculated at 60 percent of innocent males. A comparison of the two figures indicates that all men accused in these proceedings are not innocent. When these studies are separated according to the year of the test, race and residence of the principals, by city or by urban or rural, age of the mother at the birth of the child, and whether the study was for a divorce proceeding or a bastardy action, the divorce group was the only subgroup to show significant deviations for the overall average. The exclusion rate in this group which makes up about 10 percent of all cases was 28 percent. The reasons for this difference, which is statistically significant, is complex. Less convincing is the evidence that younger mothers have a higher exclusion rate than older mothers. These girls are probably more likely to have temporary liaisons than do older women.

10:00 THE METABOLISM AND EXCRETION OF MEPERIDINE BY THE PREGNANT WOMAN, NONPREGNANT WOMAN, AND NEONATE

Kuhnert, B.R. and Kuhnert, PM., Perinatal Clinical Research Center, Case Western Reserve University, 3395 Scranton Road, Cleveland, Ohio 44109.

The effect of pregnancy or immaturity on meperidine metabolism and excretion has not been carefully studied. This is of interest because meperidine is commonly given during labor for pain relief and the fetus receives the drug in-utero. Moreover, animal studies suggest that the hormones of pregnancy lead to decreased activity of the drug metabolizing enzymes. In the present study, gas chromatography was used to determine meperidine and normeperidine (the active metabolite of meperidine) in the plasma and urine of pregnant and nonpregnant women, and in the urine of neonates. Plasma samples were collected for at least three hours following an I.V. dose of meperidine; urine samples for three days. The results of this study show, in contrast to animal studies, that pregnant and nonpregnant women readily metabolize meperidine to normeperidine and excrete both compounds in a similar manner. The neonate, however, was found to be less efficient in metabolizing and excreting these drugs.

Supported in part by NIH USPHS Grant No. 5M01 RR-00210

DETECTION OF PATHOLOGICAL CONDITIONS VIA NEUROLOGICAL SIGNAL PROCESSING, Norman Kenneth Bodenstein, Ohio State University.

10:15 Neurological communication and control is similar to its electrical engineering counterpart. Radar signals are used to detect and identify aircraft. Sonar signals are used to detect and identify submarines. Autopilots use probabilistic navigational signals to fly aircraft. Thirty years ago, Dr. Norbert Wiener proposed the use of neurological signals to power limb prosthesis; at that time the statistical and physiological background and mechanisms for such "cybernetic" limb prosthesis were not yet developed. In 1975 Dr. Graupe showed how artificial limbs can properly distinguish tasks, based on the processing of neurological signals.

Just as one can identify coherent speech from a series of electrical signals given over the telephone, one can: (1) detect cardiac abnormalities from an electrocardiogram (EKG), (2) detect renal disease from an electroencephalogram (EEG), (3) use an EEG and average evoked response (AER) to detect pathological conditions of the nervous system and learning disabilities and (4) use a triaxial accelerometer to quantify tremor and ataxia.

We see from the above that electrophysiological measurements can be used to detect pathological conditions in humans. When cells undergo mutations (i.e., cancer) their electrical signals also change. This change should be detected in the time or frequency domain; thus, electrophysiological data analysis can be used to detect and classify pathological conditions.

10:30 Business Meeting

D. MEDICAL SCIENCES

AFTERNOON SESSION

Beeghly Library A-V Room

DELMAS ALLEN, Presiding

COMPARATIVE STUDIES OF UROPORPHYRINOGEN SYNTHASE (URO-S) FROM NORMAL AND PORPHYRIC ERYTHROCYTES. Kreimer-Birnbaum, M., Med.College of Ohio, Toledo, OH. 43699

1:30 Reduced level of activity of URO-S is presently considered to be the primary genetic defect in Acute Intermittent Porphyria (AIP). Red cell URO-S activity in AIP patients has shown some 50% reduction in V_{max}: 16.3 ± 2.3 units (nmoles porphyrin/ml rbc/hr at 37°) as compared to 36.5 ± 7.7 units in normal controls. It has not been established if the reduced URO-S activity is due to imparied synthesis of enzyme, the presence of an inhibitor, or a kinetically abnormal enzyme. Therefore, we have carried out studies to explore some of these possibilities. Kinetic studies have shown similar Kms for the substrate, (porphobilinogen): 6.9 ± 0.6 μM and 6.3 ± 1.5 μM for AIP and controls, respectively. URO-S has pH optima of 7.6 and 8.2 in 0.1M phosphate buffer and tris buffer respectively. The enzyme from both sources seems stable up to temperatures of 65°. No evidence has been found, so far, for a thermolabile inhibitor being responsible for the low URO-S activity seen in AIP carriers.

Equal part mixtures of control and AIP hemolysates gave intermediate URO-S activity levels, ruling out some readily soluble inhibitor. Dialysis had no significant effect on either AIP or control URO-S levels. URO-S has been purified over 300 fold using its relative thermostability, and other techniques such as ion exchange and molecular filtration chromatography. Since no significant differences between the AIP and the normal URO-S have been revealed, the molecular defects in AIP may be associated with decreased levels of enzyme, rather than with a mutated protein. (Supported by Grant SO7-RR-05700-8)

DOSE-RELATED POSITIVE INOTROPY OF DOBUTAMINE^{R} (DB). Ann Pakalnis and Philip B. Hollander. OSU COL MED DEPT PHARMACOL 1645 Neil Ave., Columbus, Ohio 43210

1:45 The positive inotropic effect of DB, (±)-4-(2-((3-(p-hydroxyphenyl)-1-methylpropyl)amino)ethyl)pyrocatechol hydrochloride, was studied to elucidate its direct action in isolated Langendorff perfused hearts of guinea pigs. Hearts were maintained at 30 ± 0.1°C in modified Krebs-Henseleit medium with a pH = 7.41 when aerated with 95% O_2 and 5% CO_2. All hearts were equilibrated before performance criteria were established. Selected hearts were monitored for control data and then perfused with DB at 10^{-9} to 10^{-4}M for at least one hour, one concentration/heart. DB produced no significant change in measured characteristics at 10^{-9}M, dose-related increases in systolic tension up to and including 10^{-5}M, and was arrhythmogenic at 10^{-4}M. Perfusion pressures increased with doses of 10^{-8} to 10^{-5}M DB. DB (≥10^{-6}M) induced positive chronotropy and decreased magnitude of R-waves. DB when compared to the action of ouabain appears to be less toxic. These data suggest that a mechanism of DB action is similar to positive inotropy of other β_1 catecholamines. Further work in our laboratory suggest that the mechanism of DB is different and distinct from that of ouabain. DB also appears to offer a larger therapeutic/toxic ratio when compared to ouabain or other cardioactive catecholamines. (Supported in part by grants from NIH, Eli Lilly Co. and PBH).

CARDIOVASCULAR PARAMETERS DETERMINED NONINVASIVELY IN NORMOTENSIVE AND HYPERTENSIVE MEN AT REST. B.Doerr and M.A.B. Frey, Dept. of Physiology, Wright State University,
2:00 Dayton, Ohio 45435.

Assessment of cardiac performance, vascular status, and hemodynamic characteristics in normotensive and untreated hypertensive men was accomplished by noninvasive monitoring techniques. 17 men (39-63 yrs) were categorized into one of 3 study groups on the basis of their previously determined seated resting diastolic pressure (RDBP): normotensive (N, all RDBP<85mmHg), established hypertensive (EH, all RDBP>90mmHg), and labile hypertensive (LH, fluctuating RDBP above and below 90mmHg). Groups were matched for age (±4 yrs), Ponderal Index ($H/\sqrt[3]{W}$, ±0.5), and race. ECG, phonocardiogram, carotid and radial pressure-pulses, and first derivative of thoracic impedance change were simultaneously recorded after participants had been sitting for 10 min. Ten-sec. data were analyzed on a beat-by-beat basis. Stroke volume (SV) and left ventricular mean pressure rise were less in EH than N ($p<.05$). Pulse wave velocities (PWV) over two pathways, pre-ejection period (PEP), PEP/left ventricular ejection time (LVET), and total peripheral resistance were greater in EH. SV was less in LH than N; and PEP/LVET and PWV over the longer pathway were greater in LH. RDBP differed among the 3 groups. There were no significant differences among the groups in heart rate, electromechanical systolic period, cardiac output, or resting systolic P. Current studies with treated hypertensive patients may reveal whether these differences are the direct result of the elevation in RDBP or represent pathological cardiovascular changes. (Supported in part by NHLBI RO1-HL19931-01 and Miami Valley Chapter AHA #57-008-767).

THE USE OF GLYCOSYLATED HEMOGLOBIN FOR THE DETECTION AND MONITORING OF DIABETES MELLITUS. W. William Spencer and Joan Desmet. St. Elizabeth Medical Center,
2:15 Dayton, Ohio 45408.

Glycosylated hemoglobin (Hemoglobin A_{1c}) has been reported as useful indicator to detect and monitor patients suffering from diabetes mellitus. In the case of diabetics this hemoglobin may serve as an indicator of the mean blood glucose concentration during the previous two month period. This paper will be concerned with the evaluation of the procedure for implementation in a general hospital. Data will be presented for a normal population according to age distribution known to have no family history of diabetes. Data will also be presented to illustrate the levels of this hemoglobin in controlled and non-controlled diabetics. Results from this test will be presented from a local screening program for the detection of diabetics in a general population group.

2:30 EFFECT(S) OF STH AND HYPERGRAVITY ON ARTICULAR AND EPIPHYSEAL CARTILAGE LAYERS OF WEIGHT BEARING AVIAN BONES. A. Cisneros, E. Lang and J.A. Negulesco, Anatomy Department, College of Medicine, The Ohio State University, Columbus, Ohio, 43210.

The effects of growth hormone on the articular and epiphyseal cartilage layers of animals exposed to hypergravity have not been adequately studied. Female chicks at 3 weeks post-hatch were maintained for 2 weeks at earth gravity (1 g) or 2 g with daily intracapsular injections of 0.4 mg STH in the tibio-tarsometatarsal joint. Animals were sacrificed at 5 weeks post-hatch and the tibio-tarsometatarsal joint was dissected free, fixed in 10% BNF, decalcified in 3% Nitric acid, doubly embedded, sectioned at 7-8 μm, and routinely processed for histological measurements of the midsagittal height of the cartilage layers of the proximal tarsometatarsal epiphyses. STH treatment increased growth in height of the articular cartilage layer and inhibited growth in height of the proliferating and calcified cartilage layers. Animal exposure to 2 g without STH treatment resulted in increased growth in height of the resting cartilage layer and inhibited height growth of all other cartilage layers of the epiphysis. Growth in height was increased in the resting and calcified cartilage layers and it was inhibited in all other epiphyseal layers by combined STH treatment and animal exposure to the 2 g environment.

This investigation was supported, in part, by the General Research Support Fund of The Graduate School of The Ohio State University (Project no. 221164).

2:45 FLUORIDE AND BONE GROWTH. Larry J. Ream, Department of Anatomy, Wright State University School of Medicine, Dayton, Ohio 45431.

The effects of orally ingested fluoride (120 ppm in distilled water) on femoral bone structure and mineralization in the rat were investigated. Results were compared to untreated controls. All animals were weighed each week of the 4 week experimental period and blood samples were taken prior to sacrifice.

Rate of growth and well being of all animals did not significantly differ. Serum calcium, phosphorus and magnesium levels were normal, however, serum alkaline phosphatase levels were slightly increased. No gross structural bone changes were observed although increased intracortical resorption occurred in the femoral diaphyses as evidenced by increased numbers of resorption cavities. Periosteal alkaline and acid phosphatase activities increased mainly because the cells containing these enzymes increased. Periosteal osteoid production increased while the rate of mineralization decreased. Femoral weights were similar but since surface bone formation prevailed over intracortical resorption, the total bone mass increased. An increase in the distal epiphyseal plate thickness occurred due to the failure of cartilage resorption. However, the resorption of bony metaphyseal trabeculae was either increased or not affected.

The results of this study indicate that short term treatment of high fluoride induced increased formation as well as increased resorption of bone without significantly changing the serum ion concentration. Bone formation prevailed over bone resorption and the additional bone formed differed from normal bone by its low rate of mineralization and irregular structure.

3:00 EFFECT OF ESTROGEN ON THE TENSILE STRENGTH OF HEALING FRACTURED AVIAN RADII. L.R. Toney, Dept. of Mechanical Engineering, J.A. Negulesco, Dept. of Anatomy, A.E. Engin, Dept. of Engineering Mechanics, The Ohio State University, Columbus, Ohio, 43210

Eighty white leghorn chicks were subjected to complete closed fracture of both radii at three and four weeks post-hatching. The former group underwent two weeks of post-fracture healing; the latter group was permitted one week. Post-fracture, the control chicks received daily injections of 0.2 ml saline and the estrogen-treated chicks received 0.4 mg Estrone in 0.2 ml saline. The birds were sacrificed at five weeks post-hatching and both radii were immediately removed and frozen in Ringer's solution. Tensile tests were performed on the healing callus with specially designed testing apparatus and load vs. deflection curves were obtained. Preliminary results from the one week post-fracture study indicate a significantly higher slope of the initial linear portion of the curve (Young's modulus of elasticity) for the estrogen-treated chicks.

This investigation was supported, in part, by the General Research Support Fund of The Graduate School of The Ohio State University (Project no. 221164).

MEDICAL SCIENCES

3:15 CHANGES IN THE AVIAN RETINA AFTER EXPOSURE TO HYPERGRAVITATIONAL FORCES (2 g). Richard G. Orlando and John A. Negulesco, Department of Anatomy, College of Medicine, The Ohio State University, Columbus, Ohio, 43210.

The effects of hypergravitational forces on the retina of vertebrates have been inadequately investigated. The present study compares the effect(s) of one week exposure to a 2 g environment on the posterior pole of the retina in developing birds. Female chicks at two weeks post-hatch were maintained for one week at either earth gravity (1 g) or a 2 g environment. Animals were sacrificed by decapitation and the eyes were enucleated. The posterior retina was fixed in 10% BNF, embedded, sectioned at 7-8 μm and processed with various histologic stains for micrometer measurements of the retinal layers. Significant retinal changes, from controls, were observed in the: 1) decrease in width of the rod and cone layer, 2) decrease in width of the inner nuclear layer, and 3) decrease in width of the inner plexiform layer of the 2 g animal. The width of the ganglion cell layer and of the outer nuclear retinal layers of both experimental and control animal groups was nearly identical.

This investigation was supported, in part, by the Roessler Memorial Foundation of The College of Medicine and by the General Research Support Fund of The Graduate School (Project 221164) of The Ohio State University.

3:30 VESTIBULAR FUNCTION IN HYPERACTIVE CHILDREN. David L. Clark, Ph.D., Vinod Bhatara, M.D., and L. Eugene Arnold, M.D., Department of Anatomy, Hamilton Hall, 1645 Neil Avenue, The Ohio State University, Columbus, Ohio, 43210.

Vestibular function was examined in 11 hyperactive and 10 normal children. Ages ranged from 3 to 13 years with a mean of 9 years for the hyperactive group and 8 years for the normal group. The horizontal semicircular canals were stimulated with a step change in angular velocity. Older children were seated in the rotary chair with a lap belt restraint and head rest. Younger subjects were held in the lap of an assistant. The chair was gradually accelerated to 150 degrees per second (25 rpm) over 60 seconds, held at 150 degrees per second for 60 seconds, then impulsively decelerated. Each child was exposed to four stimuli with an interstimulus interval of at least 5 minutes. Tests were conducted in total darkness and mental arithmetic or other age appropriate mental tasks were used to maintain mental arousal. Postrotatory nystagmus was examined to determine cupular (T_c) and adaptation (T_a) time constants. Statistical analysis showed a marginally significant difference in T_c ($P < 0.05$) and no significant difference in T_a. Intersaccadic interval, measured during primary postrotatory nystagmus, was significantly longer in the hyperactive group than in the normal group ($P < 0.001$), suggesting an anatomical correlate of hyperactivity.

3:45 HISTOLOGICAL AND ULTRASTRUCTURAL DEVELOPMENT OF THE FETAL RAT ADRENAL GLAND. Stockelman, R.E. and D.J. Garvey, Department of Anatomy, Wright State University, Dayton, Ohio, 45435.

Histological and ultrastructural development of adrenal glands was studied in fetal Long-Evans rats during the last five days of gestation, and correlated with biochemical changes in the glands.

In examining the ultrastructure of the developing adrenal cells, we found that during the last days of fetal life, the laminated mitochondrial cristae and rough endoplasmic reticulum present in the cortical cells early in development were gradually replaced by vesicular cristae and smooth endoplasmic reticulum characteristic of adult cells. The number and size of lipid droplets and mitochondria in the adrenal cortical cells appeared to increase with the age of the fetus. Blood forming foci which are peculiar to the developing gland could be seen at all ages studied. Corticosterone and lipid concentration in the adrenal glands progressively increased through the last days of gestation. The results indicate that during the late prenatal period the adrenal gland undergoes a rapid transformation from an embryonic primordium to a functional endocrine organ.

4:00 DEVELOPMENT FOR THE ADRENAL ENZYME 21-HYDROXYLASE - David Bowyer, College of Wooster, Wooster, Ohio 44691

The mechanism of adrenarche, the increase in primates during sexual maturation of adrenal androgen secretion, is unknown. An unanswered question is the nature of enzymic changes responsible for increased dehydroepiandosterone secretion, the chemical marker of adrenarche. This change may result from an increase in 17-20 desmolase activity or a reduction in 3-L-hydroxysteroid dehydrogenase isomerase activity. Such changes could be measured by the absolute activity of these two enzymes in the microsomal fraction of adrenals before and after adrenarche. In addition the relative activities of these two enzymes could be compared with two other enzymes in the cortisol pathway namely 17-hydroxylase and 21-hydroxylase.

I used the rabbit as a convenient model for a reliable method of measuring 21-hydroxylase activity in the adrenal microsomal fraction. The activity of 21-hydroxylase was determined by the amount of 11-desoxycortisol formed from ^{3}H or ^{14}C 17-hydroxyprogesterone during incubation with adrenal microsomes. The product, 11-desoxycortisol, was isolated from the reaction mixture by TLC. Product formation was followed by liquid scintillation counting and reported as nmoles 11-desoxycortisol produced per min/mg microsomal protein. Optimal reaction conditions were determined for the: amount of microsomal protein, time of incubation, temperature, pH, by standard Michaelis Menton kinetics. This project was completed during the summer of 1978 at NIH, Bethesda, Maryland under the direction of Dr. Gordon Cutler.

4:15 STRESS RESPONSE OF THE PITUITARY-ADRENAL SYSTEM IN YOUNG AND OLDER RATS INJECTED WITH THYROXINE OR SALINE. Lee A. Meserve, Dept. of Biological Sciences, BGSU, Bowling Green, OH 43403.

Stress response of the pituitary-adrenal system appears to be subnormal in aged rats as do circulating levels of thyroid hormones. The depression of pituitary-adrenal response in hypothyroid postnatal rats has been demonstrated. Thus, influence of thyroxine (T_4) administration on stress response of aging rats was investigated. Male Holtzman rats were started on experiment at 50 days or approximately 1 year (retired breeders) of age. Six days per week of every other week for 30 weeks, T_4 was given subcutaneously. Young rats received 0.85mg T_4, and older rats received 1.65mg, in 90 doses. Controls received physiological saline. At the end of 30 weeks pituitary-adrenal response was measured by fluorometrically comparing basal concentrations of adrenal and serum corticosterone (B) to those 15 min after either: 1 min ether stress; 8IU depot adrenocorticotropin (ACTH) injection; or 0.1 ml subcutaneous saline injection. Body and organ weights were also determined. Body weights of young or older rats were not altered by T_4 injection. Adrenal and serum B were increased in young and older rats by all stimulatory manipulations, regardless of T_4 administration. However, T_4 reduced basal serum B in older rats. Results suggest: (1) stress response to ether or saline injection, or direct adrenal response to exogenous ACTH is comparable in 260 and 575 day old rats after 30 weeks of handling and injection; (2) body weight and stress response are not altered by T_4 at this dosage; (3) basal serum B levels are depressed in T_4-injected older rats, perhaps by increased feedback sensitivity.

4:30 A CLINICAL LABORATORY TEST FOR FETAL LUNG MATURITY. Kuhnert, P.M. and Kuhnert, B.R. Perinatal Clinical Research Center, Case Western Reserve University, 3395 Scranton Road, Cleveland, Ohio 44109.

The measurement of the lecithin/sphingomyelin (L/S) ratio in amniotic fluid has gained widespread popularity for the assessment of fetal lung maturity, and has led to the development of many L/S ratio procedures. In this study, several desirable techniques (rapid chromatogram development, planimetry, acetone precipitation of lecithin, and copper molybdate staining) used in other published procedures were integrated into a single L/S ratio test. The resulting test requires only 2 milliliters of amniotic fluid, can be performed within 75 minutes, and is semiquantitative. Methodology tests showed a high degree of reproducibility without the need for a densitometer: Coefficients of variation for the standards and amniotic fluid samples were 11% and 4%, respectively. Also, a linear relationship was observed between the L/S weight ratios in synthetic mixtures and the corresponding area ratios up to the mature value of 2.5. Clinical evaluation on a normal and high risk patient population showed excellent reliability: The accuracy in predicting fetal lung maturity and immaturity was 100% and 85%, respectively. Moreover, the numerical value of the L/S ratio in the immature range was found to be indicative of the severity of respiratory distress. Finally, the relationship between the L/S ratio and gestational age in a normal population was described mathematically by an approximating curve. We conclude from our methodological and clinical data that the L/S ratio may be determined simply and reliably using the procedure described in this report.

MEDICAL SCIENCES

4:45 THE STATE OF FORENSIC PSYCHIATRY IN OHIO

Abraham Heller, M.D., Professor, Psychiatry and Community Medicine
Wright State University, School of Medicine
Box 927, Dayton, OH 45401

In forensic institutions, psychiatry has gone through its "snake-pit" era probably exceeding in dehumanization that of civil mental institutions. The fault for such a development can be laid at many doorsteps -- of society, of government, of professionalism, of justice, for their respective indifference and failures. For the past ten years in Ohio reforms have been undertaken, forced at first by newspaper notoriety, and then by a landmark case in Federal District Court as the result of an activist mental health bar bringing to bear unprecendentedly the right-to-treatment issue for the first time in a forensic hospital, a matter of national importance. As a result, Lima State Hospital has become a field laborabory in attempted reform by judicial decree imposing legal standards and on-going monitoring of compliance. The mixed results, positive and paradoxical, are analysed from the standpoint of the different social systems involved and the task of psychiatric professionalism if it is to fulfill its public trust.

5:00 NEUROGLIAL CELL NUMBERS AND INCORPORATION OF ^{3}H-LEUCINE IN RESPONSE TO AXOTOMY,

Cova, John L., Hakan Aldskogius and Kevin D. Barron, Department of Anatomy, Medical College of Ohio, C.S. 10008, Toledo, Ohio 43699 and Department of Neurology, Albany Medical College, Albany, New York 12208.

Adult cats and kittens 6-10 weeks of age were killed 1,2,3,5,10,15, and 28 days after unilateral brachial plexectomy. ^{3}H leucine (10uCi/g body weight) was administered intraperitoneally to kittens 0.25, 0.50, 2.0 or 16 hours before death. Paraffin serial sections of C8 spinal cord (4μ thick) were stained with cresyl violet. Slides with labelled tissues were dipped in Kodak NTB-2 emulsion and counterstained with cresyl violet. Grains overlying the nucleus and cytoplasm of the first 100 glial cells encountered were included in the sample. Glial cell counts (vascular cells excluded) were made on every other serial section over a distance of 80 u with aid of an eyepiece square grid. Camera lucida drawings were made of an area contained within the grid which included the dorsolateral and ventrolateral cell columns. The portion of drawing representing neuropil was determined indirectly by weighing.

Mean glial cell numbers/1000 μ^{2} of neuropil and distribution of glial cells ipsilateral to axotomy were not different from those of the contralateral side in kittens or adult cats at any postoperative time intervals examined. The incorporation of labelled precursor by kitten glial cells on the operated side was not significantly different from that on the unoperated side at any of post-injection time intervals.

These data indicate that modifications in neuronal metabolism associated with axotomy occur in the absence of glial proliferation or changes in glial protein synthesis.

5:10 OPTIMUM TIME VARYING PRESSURE/VOLUME IN THE LEFT VENTRICLE DURING SYSTOLE PERIOD.

Ricardo Sanchez and Gokhan Bilge, Bio-Medical Engineering Center, The Ohio State University, Columbus, Ohio.

The objective of this work was to investigate the relationship of the waveshape of the pressure/volume ratio of the left ventricle as it relates to the minimization of the work done by the heart during systole. Two analog models of the left ventricle were described by the following equations: First model: $P(t) = u(t)\cdot(v(o) - \int_{o}^{ts} i(t)\cdot dt)$; $P(t) = Z\cdot i(t)$. Second model: $P(t) = L\frac{di}{dt} + R_1\cdot i(t) + V_1(t)$.

In the second model the expression $P(t) = Z\cdot i(t)$ is changed by the addition of a derivative term and a non-flow term. Where, P(t) is the left ventricular pressure, v(o) is the left ventricular end-diastolic volume, i(t) is the blood flow rate ejected from the left ventricle, Z is the input impedance of the arterial system, u(t) is the pressure/volume ratio, L is the inertia of the blood at the aortic valve, R is the resistance to the flow of the aortic valve, $V_1(t)$ is the aortic pressure and ts is the end systolic time (when the aortic valve close).

Applying the Minimum Principle of Pontryagin with the cost functional $J = \frac{1}{2}\int_{o}^{ts} u^{2}(t)\cdot v(t)dt$ to the above equations, an optimum u(t) was found and then compared to the experimentally determined values for a normal heart action. In addition, the effects upon the optimum u(t) of different values of the end-diastolic volume and peripheral resistance were determined.

The paper will discuss data analysis and conclusions.

5:20 OPTIMALIZATION OF VENTILATORY CONDITIONS. C. Druzgalski, R. Donnerberg, and R. Campbell, The Ohio State University Bio-Medical Engineering Center, Division of Pulmonary Diseases, and Department of Electrical Engineering, Columbus, Ohio.

Progressive diseased conditions in COPD patients may result in the necessity of permanent ventilatory support during their hospitalization as well as at home. Due to the lack of any feedback, the inspiratory-expiratory ratio of respiratory cycle of a ventilatory may not correspond with that of a patient. This interference can result in the change of functional residual capacity (FRC) and affect blood gases.

For this reason we have developed a simple method for optimalization of ventilatory conditions and tested it on patients using Emerson Post-operative Ventilators. The system consists of a bellow's type pneumotachograph used as a sensor of relative FRC changes. Resulting pressure variations represent respiratory cycle and a base line corresponding to zero flow line displays changes in FRC resulting from various inspiratory-expiratory ratios (I/E R). Preliminary studies have shown individualized requirements for I/E R determination. It was found that minimal FRC can vary in the range 1:2 to 1:4 I/E ratio and 1:2 I/E ratio cannot be considered as a optimal value in all patients. The slope of the relative FRC changes as a function of ventilatory parameters indicates individualized character of optimalization.

Optimalization of these parameters is of fundamental importance in patient management and maintaining proper vital functions due to the fact that ventilatory support may last for months or even years.

5:30 A REVIEW OF AN IN-HOUSE BIOMEDICAL ENGINEERING DEPARTMENT. David Bradley, Bio-Medical Engineering Center, The Ohio State University, Columbus, Ohio and Venkatasamy Veluchamy, Biomedical Engineering Department, Mt. Carmel Medical Center, Columbus, Ohio.

This paper discusses the possible contributions that an in-house bio-medical engineering department can provide to a hospital and also reviews the activities of a typical student engineer during a six-month internship in such a department.

The qualified biomedical engineer can benefit the hospital by both the services that he performs and the costs that he can save for the hospital. The engineer can provide expertise in matters related to equipment usage, safety, purchase, design and maintenance, as well as aid in the design of new facilities. By supervising department technicians in the in-house servicing of equipment, most outside service contracts can be eliminated. In three years, the Mt. Carmel department has taken over most equipment servicing, providing not only a major financial savings to the hospital, but also a faster response time in repairs, particularly in emergency calls.

As an intern with the department, the student engineer participated in most of the engineer's activities mentioned above. He was introduced to the management aspects of the biomedical engineer as well. The principal project of the internship was the design of a computer-assisted equipment maintenance documentation system to increase and improve the contributions that the biomedical engineering department can provide for this health-care facility.

Details of the PM program and its evaluation will be presented.

5:40 MAGNETIC LOCATION INSTRUMENTATION FOR REMOTE IN VIVO SENSORS Herman R. Weed, Department of Electrical Engineering, Bio-Medical Engineering Center, The Ohio State University, Columbus, Ohio, and Ram M. Engira, Department of Electrical Engineering, Punjab Agricultural University, India.

The magnetic position sensor is an instrument for determination of the location and orientation of a catheter device in a nonvisually accessible location. The device uses a low level magnetic field pattern to scan the body and a magnetic field sensing device attached to the element to be sensed. The minimal damage effects of low level magnetic fields on living tissue have been well documented.

The sensor measures the radial component of the magnetic field of a magnetic dipole in which the radial component goes through an inversion of sign along the transverse axis.

A variety of situations in the field of science such as heart catheters require determination or monitoring of the location and the orientation of a device in an animal or in human tissue. Use of x-radiation or ultrasonic radiation may not be permissable due to potential radiation damage. As an alternative, this low level magnetic field may be used for the purpose of determining location and orientation.

The unit sensor is capable of locating the position and orientation of the tip with a sensitivity of 100_{μ} volts/μ meter and to a resolution of 1μ meter at 14 cm. distance. The accuracy definition depends upon the magnitude of the reversed radial field component and the sensor sensitivity. Data will be presented on theoretical and experimental operation.

5:50 COMPUTER-CONTROLLED TESTING USED TO DETECT ANOMALIES OF RETINAL DISPARITY IN THE HUMAN VISUAL SYSTEM. Dale Drollinger, Ronald Jones, and Herman Weed, The Ohio State University College of Optometry and Bio-Medical Engineering Center, Columbus, Ohio.

A computer controlled random stimulus generating and data sampling system was designed and constructed at The Ohio State University to test for stereo and vergence anomalies. It is believed that these types of defects are related to stabismus, ocular deviation caused by a failure of the visual system to detect and respond to retinal disparity. Independent binocular stimulation is accomplished by time multiplexing the red and green blanking controls of the TV while the subject views the screen through color filter lenses. Eye movements are recorded by frame mounted photo-diodes placed in the viewing field. Each of the diodes' outputs are directly fed into a data sampling computer.

This study is intended to investigate the role of vergence-anomaly in stabismus and oculomotor imbalance by the examination of the disparity induced eye movements in normal and strabismic subjects. The mode of inheritance of these anomalies will be evaluated by doing a multi-generation human study. As a consequence of this study, additional knowledge of the physiological process of disparity detection will be gained.

E. PHYSICS & ASTRONOMY

MORNING SESSION
Pfleiderer P4
GARY DUKE, Presiding

9:00 VIDEOTAPING PHYSICS LECTURES FOR STUDENT USE. Harry C. Nash, Department of Physics, John Carroll University, Cleveland, OH 44118.

An educational experiment to meet the needs of students who have class conflicts, are absent from lectures, or wish to review lectures, is in its second year. Videotaping is accomplished with minimum distraction of the lecturer and the students present in the class. Tapes are available for student viewing for a period of two weeks. The initial investment is modest, and operating costs are negligible. The procedure and equipment used will be described in detail. The system is operated entirely by the lecturer, and is adaptable to any course presented using an overhead projector.

9:15 THE TEKTRONIX GRAPHIC COMPUTING SYSTEM AS A TEACHING AID. Klaus Fritsch, Physics Department, John Carroll University, Cleveland, Ohio 44118

We have prepared a number of BASIC programs for the TEKTRONIX 4051 computer relating to courses in classical mechanics, network analysis, and operational amplifier applications. The programs are designed to clarify certain types of homework problems by means of graphs. The programs have been recorded on magnetic tape cartridges. The student loads the cartridge and selects the appropriate file. Text recorded on the tape provides the student with a statement of the problem and asks the student to specify certain parameters. The system then generates appropriate graphs. A number of questions are asked to make sure that the student has grasped the important features of the plot. The student can rerun the plot for different parameter values or go on to the next problem. Samples of specific programs and the associated graphics will be provided.

9:30 NATURALIS PHILOSOPHIE ATMOSPHERE
Keith Saard
844 Skinner Avenue
Painesville, Ohio 44077

Fellow Artists and Scientists:

After 13 years of experimental research, I have come to the conclusion that when Latent Heat is released in the atmosphere, your primary resultant factor is wind and your secondary resultant factor is precipatation. (on a 7 to 3 ratio) By inducing a cooling agent, like Dry Ice or Silver Iodide, you can increase the heat release and thus increase the resultant factors. Increase the heat release a little, and you can change deserts into gardens. Increase the heat release a lot, and you can stop hurricanes, blizzards, tornados, etc.

Hopefully, this knowledge will be used to modify potentially dangerous weather situations and advert climatic disasters, instead of trying to survive inspite of them.

9:45 STRESS-OPTICAL COEFFICIENTS MEASURED WITH NON-CONTACT METHODS. Stamatios V. Kartalopoulos, Department of Electrical Engineering, The University of Toledo, Toledo, Ohio 43606

When an optically transparent solid plate is under stress, then its thickness and its index of refraction will be altered. When a monochromatic light ray passes through it, in general, this will be resolved in two rays out of phase and each one polarized in the direction of the principal stresses. Favre [1929] connected this phase difference with the principal stresses with the use of the stress-optical constants. If in addition, the plate includes a crack, then as rays pass through it and in the vicinity of the tip of the crack, due to the high concentration of stresses in this area, they are deviated and form two caustic surfaces; one by the rays passing through it and one by the reflected rays by the surfaces of the plate. The interception of the two caustic surfaces, almost of a circular form, can be seen on two screens. The relative size of the observed caustics and the number of displaced fringes during leading, as a result of the phase difference of the two rays, lead to a non-contact method for determining the stress-optical coefficients of the medium.

10:00 EXPERIMENTAL INVESTIGATION OF A LOW TEMPERATURE STIRLING ENGINE. E. William Beans, Dept. of Mechanical Engineering, The University of Toledo, Toledo, Ohio 43606

An experimental program was conducted to determine the performance characteristics of a small Stirling engine. The test engine was a 6 in^3, low speed Stirling engine. The work fluid was air at atmospheric pressure. The heat source was an electrical resistance heater. The heat sink was atmospheric air or cooling water. The objective of the program was to operate a Stirling engine with a low temperature energy source.

The performance characteristics investigated included torque, power and cycle pressure as a function engine speed and input power. Engine indicator diagrams were generated. Experimental results compared favorably with theoretical analysis. An empirical model of operation suitable for low speed engines was developed based on theoretical results.

Low temperature heat sources such as condensing steam and boiling glycerin (550°F) were investigated. To date, operation of the engine with this heat source has not been obtained.

10:15 Business Meeting

F. GEOGRAPHY

MORNING SESSION
College Hall C218
DAVID REITH, Presiding

9:00 SPATIAL ASPECTS OF INCOME DISTRIBUTION CHANGE IN OHIO. Mohan N. Shrestha and V. N. Krishnan, Department of Geography, and Economics, Bowling Green State University, Bowling Green, Ohio 43403.

A study of change in income distribution at county level offers an opportunity to assess the direction and the degree of equality achieved within the state of Ohio. The main purpose of this study is to investigate the relationship between various economic and social factors and the degree of equality in income distribution, and to assert the direction of change since 1950. The first part of the paper summarizes the various methods of measuring income equality, and the second part deals with assessing the importance of key economic and social variables in explaining the spatial pattern of income equality over time.

9:15 LAND-USE CHANGES IN A FRONTIER AREA OF PARANA, BRAZIL FROM 1972 TO 1976
Jerry E. Green, Miami University, Oxford, OH 45056
Byron E. Logan, Miami University, Oxford, OH 45056
James P. Buschur, Miami University, Oxford, OH 45056

Remote sensing has proven itself for monitoring changes in land-use in developing frontier areas. One such frontier area in the State of Paraná, Brazil, has undergone considerable change in land-use between 1972 and 1976 as the result of advancement of infrastructure into western Paraná. Based on the U.S.G.S. Level I classification system, identification of changes in agricultural land, native vegetation, water impoundments, and urban extent, has been made and analyzed. Such analysis in terms of location and acreage extent provides a review of contemporary change and a base from which future change can be monitored.

9:30 A FURTHER ANALYSIS OF URBAN LAND VALUE: MADRAS, INDIA. G. Venugopal, Ashok K. Dutt and Allen G. Noble, Department of Geography, University of Akron, Akron, Ohio 44325.

The spatial behavior of urban land value has been studied in detail during recent years. Most studies were done in western cities where published data are readily available. The study of urban land value behavior in Madras city, India, attempts to redress the balance, at least for India.

To analyze land value behavior, a set of 12 variables has been selected and mapped. The visual analysis of these maps indicates sectoral variations in the distribution pattern. Hence, these variables are used in a multiple regression for the city as a whole, and for five sectors arbitrarily selected to differentiate major transportation routes. The individual sectoral analysis explains a significant amount of variation. A set of four dummy variables are introduced into the equation, and the variation thus explained is significantly higher. When the residuals are mapped two pockets of high land value, one in the CBD and the other in the southwestern section, and a pocket of low, land value just north of the CBD result. A geographical explanation for such a variation is provided.

THE ROLE FOR GEOGRAPHERS IN ENVIRONMENTAL MANAGEMENT
Jeannette H. Fantone, Geography Dept., Miami Univ., Oxford, Ohio 45056

The role of geographers in developing policy for environmental management has increased substantially. However, little information is available which either explicitly associates specific steps in the decision-making process with the skills and tools of the geographer, or notes where the geographer can apply his knowledge as input to the decision-making process to create an enduring management program. Utilizing the Coastal Zone Management Act of 1972 as an example of a comprehensive resource management program connections are drawn between the goals of the Act and the perspective of the geographer. By systematically assessing each goal of the Act as to how the individual management decisions will be made to implement the overall goal of environmental quality, analysis and management, a second group of connections are made. These connections associate the individual techniques of the geographer to the manner in which individual management decisions will be regulated. These connections, such as; the transformation of qualitative data for interpretation in quantitative decisions, understanding the spatial characteristics of human behavior, and the environmental perception of various land-users suggest that geographers should play a more active role in comprehensive management programs.

10:00

STREET TREE PROGRAMS FOR SMALL TOWNS AND CITIES
Oliver D. Diller
1368 E. Wayne Ave., Wooster, Ohio 44691

Many urban communities under 50,000 population have no organized tree planting and maintenance programs. Problems often originate from soft maples and other less desirable trees which were planted in the early 1900's and are now in a decadent condition.

A shade tree commission can provide the legal basis for beautification. The most successful commissions consist of six members - three by virtue of position and three interested and knowledgable private citizens. The city engineer, administrator or service director, and the chairman of laws and ordinances represent Council and Administration. The private citizens are appointed by the Mayor, usually for three year terms.

A model tree ordinance provides that the municipality assumes complete control over all public tree planting, maintenance, and removal. Most small cities and towns carry out these functions through contracts with qualified and insured private tree companies. Communities having successful tree programs usually have the following characteristics: 1) A legally constituted tree board or commission; 2) appropriate ordinances for urban tree management; and 3) a comprehensive urban forestry program supported by a minimum of one dollar per capita public funds.

10:15

GEORGE PERKINS MARSH: CONSERVATIONIST OR MORALIST?
Terry L. Allen
Department of Geography, 219 Shideler, Miami University
Oxford, Ohio 45056

In the 22 years since George Perkins Marsh was first widely recognized by the 1956 symposium "Man's Role in Changing the Face of the Earth," Marsh has been all but immortalized. His book Man and Nature has been the focus of much attention and praise, and his comments on environmental perception and conservation have served as organizational impetus to geographers and conservationists alike. But to profess that George Perkins Marsh belongs to any one discipline is unrealistic. Marsh was restricted by no academic boundaries, but rather was universal in his approach to knowledge. Discovery of an underlying motivation in Marsh's life lends support to this thesis, as do the nature and variety of his works.

Influenced by his religious parents, instructed by strict puritan educators, and encouraged by his contemporaries, Marsh was considered a scholar in several fields, but even Marsh never realized his position within the scholastic world. A survey of Marsh's unusually varied professional and personal accomplishments suggests that his theme was one of insight and morality, as opposed to a strict identification with conservation or resource awareness as has so often been suggested.

10:30 Business Meeting

F. GEOGRAPHY

AFTERNOON SESSION
College Hall C218
LAURENCE J. C. MA

1:00 A TENTATIVE CLASSIFICATION OF DUTCH COLONIAL RURAL HOUSES IN NEW YORK AND NEW JERSEY. Allen G. Noble, Department of Geography, University of Akron, Akron, Ohio, 44325.

Despite considerable attention by cultural geographers to the early settlement landscapes which evolved in both New England and southwestern Pennsylvania, the colonial Dutch culture which occupied the middle ground of New York and New Jersey, has been largely neglected. This study offers a tentative classification of those rural dwellings which were either built during the Dutch colonial period, or were constructed later by Dutch settlers. The regional variation of such houses is discussed.

1:15 THE FACTORIAL ECOLOGY OF SAN ANTONIO'S MEXICAN-AMERICAN DISTRICT COMPARED TO KNOWN ECOLOGIES OF BLACK RESIDENTIAL AREAS. Robert S. Bacon. P.O. Box 101, Oxford, Ohio 45056.

A factorial ecology of the 1970 Mexican-American district of San Antonio, Texas was performed and compared to published factorial ecologies of Black residential areas in other cities. In San Antonio, three orthogonal dimensions captured 73.3 percent of the input variance of census tracts for 35 indicants. The first dimension, socio-economic status, was defined by education, income, and occupation variables. The second, family status, was composed of demographic characteristics such as age, household size, and owner occupancy. The third was characterized by variables related to population transiency. These dimensions of social structure tend to be similar to those identified by factor analysis of Black residential districts. The spatial pattern of factor scores in San Antonio also tended to be similar to those revealed in previous studies of Black residential areas. Socio-economic status tended to increase toward the edge of the district. Variation in family status showed that inner tracts were characterized by older persons, living in small households, occupying vental units while the reverse held for the edge of the district. Transiency exhibited zonality in that centrally located tracts had the greatest population turnover. Generalizing, the results suggest that census tracts within ethnic/racial enclaves are differentiated according to the socio-economic status, family status, and transiency characteristics of their inhabitants and are spatially distributed in a zonal pattern.

1:45 THE SPREAD OF DEMOCRACY ALONG THE CARIBBEAN, OR FAREWELL TO THE BANANA REPUBLIC. Thomas D. Anderson, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403.

The popular image of Latin America as a part of the world ruled mainly by dictators is challenged, specifically in the cases of those countries closest to the United States. Within a region defined as stretching from Mexico through the Guianas, nearly two thirds of the present governments are identified as having been chosen in open elections. More importantly in terms of human freedoms, nearly eighty per cent of the region's population lives within this majority of political units. A brief historical analysis of the trend is included and differences between the Spanish and non-Spanish cultural components are described. Recent political events are discussed within the context of a human rights theme. Final attention is given to the potential effects of these conditions on the processes of modernization.

2:15 SOVIET IRON ORE: ITS LOCATION, RESERVES, PRODUCTION, AND EXPORT

Tony Misko and David Misko 718 No. Ridge Rd.E, Lorain, Ohio 44055

The Soviet Union possesses the greatest known iron ore reserves in the world. They are put at 114 billion metric tons. About one-half, 62.5 b.m.t., is classified as marketable industrial quality. Forty-eight b.m.t. of this, 76.5 percent, is in the Western Zone of the U.S.S.R. Fourteen b.m.t., 23.5 percent is in the Eastern Zone. Major concentrations are located at Krivoy Rog in the Ukraine, the KMA in the Central Region, the Urals, and the Northwest in the Western Zone. The Eastern Zone deposits are in Kazakhstan, Western Siberia, and the Angara region of Eastern Siberia. The annual crude ore production averaged 19,902 million tons and the marketable ore 8,360 m.t. from 1960 to 1976. The 1977 production was 477 m.t. of crude, 243 m.t. of marketable, 161 m.t. of concentrates, and 36 m.t. of pellets. This is more than enough to meet their domestic requirements. In 1975, the U.S.S.R. exported 43.6 m.t. with the bulk going to the Comecon nations of Eastern Europe.

2:30 COMPARISON OF AIR TEMPERATURES, SOIL SURFACE TEMPERATURES AND SUB-SOIL TEMPERATURES OF UZBEKISTAN

Hodgkins, Jordan A.
5812 Glad Boulevard
Kent, Ohio 44240

Smith, Clyde I.
2805 Boltz Road
Akron, Ohio 44313

It has been predicated in much of the literature that desert soils attain extremely hot temperatures. Yet this characteristic has seldom been examined except as a surface phenomenon in isolated instances. Soviet textbooks on the deserts of Central Asia frequently point out that soil surface temperatures reach an absolute maximum of 170°C. or more. Such claims demand investigation and explanation. This paper compares air temperature, soil surface temperatures and sub-soil temperatures at a depth of 0.4 meters in the deserts of Uzbekistan.

2:45 COMPARISON OF OHIOANS' PERCEPTIONS OF STRIP MINING AND RECLAMATION IN 1970 AND 1975.

John R. Ray, Department of Geography, Wright State University, Dayton, Ohio 45435

In 1970 and again in 1975 the population of Ohio was sampled to determine how Ohioans felt about strip mining and reclamation in the State. Among the several items provided by respondents participating in the study was their opinion regarding these two closely related activities. In addition, the respondents were asked to give a reason for their opinions. In 1970, the proportion of the sample was equally divided between those favorable toward strip mining and those opposed to the activity. The predominant reason given by those favoring strip mining was their belief that strip mining satisfied a demand for power and fuel. Those opposed to the activity were primarily concerned over the environmental destruction they associated with the activity. In 1975, the proportion favoring strip mining was twice that found in the earlier study. The same reason for favoring the activity predominated. Positive opinions on reclamation were overwhelming in 1970. However, reasons given by respondents for their opinions varied as they perceived future needs for land. Positive opinions were expressed by an even greater proportion in 1975. Reasons given were the same as in 1970, except that a perception of a current need for land appeared in responses received in 1975.

G. CHEMISTRY

MORNING SESSION

Pfleiderer P3

THOMAS A. EVANS, Presiding

9:00 PREPARATION AND USE OF TETRAALKYLUREAS AS SOLVENTS FOR CHEMICAL INVESTIGATIONS. James M. Landry and Barbara J. Barker, Department of Chemistry, Xavier University, Cincinnati, Ohio 45207.

Non-aqueous solvents have been used in many areas of chemistry - for example, as media for reactions, spectroscopic studies, and electrochemical investigations. The present study involved the use of some 1,1,3,3-tetraalkylureas as non-aqueous solvents. The four solvents of interest were 1,1,3,3-tetramethylurea (TMU), 1,1,3,3-tetraethylurea (TEU), 1,1,3,3-tetrapropylurea (TPU), and 1,1,3,3-tetrabutylurea (TBU). Previous studies of TMU and TEU were extended and studies with TPU and TBU were initiated.

TMU and TEU, which are commercially available, were purified by vacuum distillation; however, TPU and TBU were prepared and then vacuum distilled. The synthesis of tetrapropyl- and tetrabutylurea was accomplished in two steps. After the tripropyl- and tributylurea were synthesized from appropriate amines and isocyanates, the tetra- substituted ureas were formed by the addition of n-alkyl iodides to the tri- substituted compounds.

Essential for determination of potential use of non-aqueous solvents are their physical properties; therefore, properties such as density, viscosity, and specific conductance were determined for TPU and TBU and were compared to previously determined properties of TMU and TEU. The solvents then were used as non-aqueous media. Solubilities of selected inorganic and organic compounds in TEU, TPU, and TBU were determined and TMU, TPU, and TBU were used as media for conductometric titrations of selected acids with diphenylguanidine.

9:20 SPECTROSCOPIC INVESTIGATION OF ELECTROLYTES IN TETRAMETHYLUREA. Robert D. Hooper and Barbara J. Barker, Department of Chemistry, Xavier University, Cincinnati, Ohio 45207.

Although there have been numerous electrochemical studies in 1,1,3,3-tetramethylurea (TMU) and 1,1,3,3-tetraethylurea (TEU), there have been no reported extensive spectroscopic studies in these solvents. Since proton NMR studies reveal solvent-solute interactions in solution the present NMR investigation in TMU was undertaken. More concentrated salt solutions could be prepared in TMU than in TEU; therefore, TMU was chosen as the solvent for the present study. (The dielectric constant of TMU is 23.45 and its viscosity is 0.01401 poise; whereas, the dielectric constant of TEU is 14.4 and its viscosity is 0.02363 poise.) Included as electrolytes was a series of alkali metal salts containing various anions, such as tetraphenylborates, perchlorates, and iodides. Also included were several 1,3-dimethyl-2-oxopyrimidinium and 1,3-diethyl-2-oxopyrimidinium salts.

The salt solution concentrations ranged from 0.1 to 1.0 M with the chemical shift of the TMU peak ranging from 0.01 to 0.3 ppm. A Varian A-60 NMR spectrometer with tetramethylsilane as an external standard was used in the measurements. The chemical shifts produced by the salts were a linear function of the salt solution concentrations and there was a direct correlation between chemical shifts and previously determined limiting equivalent conductances. For the tetraphenylborate salts, sodium and potassium ions shifted TMU's proton peak upfield and the rubidium and cesium ions shifted the peak downfield.

9:40 **PORPHYRINS IN THE TEACHING LABORATORY. Margaret Terpenning, Daniel Hurst, and Thomas A. Evans, Department of Chemistry, Ebaugh Laboratories, Denison University, Granville, Ohio 43023**

Porphyrin chemistry, whether represented by naturally-occurring porphyrins or synthesized analogs, is accessible to undergraduates. Experiments will be described in which a model compound, *meso*-tetraphenylporphyrin ($TPPH_2$) is prepared and reacted with either Mg^{2+} to obtain MgTPP, an analog of chlorophyll *a* or Fe^{2+} to form FeTPPCl, a model for the oxygen binding metalloporphyrin in hemoglobin. The ligand binding characteristics of the metalloporphyrins prepared are studied by visible spectrophotometry, which is also used to follow oxidation and reduction of the iron complex. Nmr is used to evaluate the magnetic susceptibility of the iron complexes and to examine the properties of $TPPH_2$.

The use of alfalfa pellets as a convenient source of chlorophylls for chromatography experiments will be discussed.

10:00 COMPARATIVE INFRARED AND VISIBLE STUDIES ON THE EFFECTS OF pH UPON THE CARBON MONOXIDE COMPLEXES OF SOYBEAN (Glycine max) LEGHEMOGLOBIN a (Lb), HEMOGLOBIN (Hb) AND MYOGLOBIN (Mb). William H. Fuchsman, Chemistry Department, Oberlin College, Oberlin, Ohio 44074, and Cyril A. Appleby, Division of Plant Industry, CSIRO, Canberra, A.C.T. 2601, Australia

Measurements of the carbon-oxygen stretching frequency (ν_{CO}) due to CO bound to hemes in hemeproteins provides an independent probe of the heme pocket. Infrared measurements can be interpreted in terms of strengths of heme-CO and protein-CO bonds.

Proton magnetic resonance studies have shown that in Lb CO at neutral pH the distal histidine's imidazole ring is close to the heme but that it is farther away at low pH; the pK for the change is 4.1. At neutral pH ν_{CO} for Lb CO (1947.5 cm^{-1}) is similar to ν_{CO} values for Hb CO (1951 cm^{-1}) and Mb CO (1944 cm^{-1}). However, the low pH form of Lb CO is different in ν_{CO} (1957 cm^{-1}) from the low pH forms of Hb CO and Mb CO (ν_{CO} = 1966-1968 cm^{-1}), although the pK values for all three ν_{CO} changes are in the range 4.0-4.6. The pK for visible-monitored titration of Lb CO is sensitive to the replacement of CO by O_2, unlike the pK values for visible-monitored titrations of Hb CO and Mb CO.

The results are explicable in terms of titration of the distal histidine imidazole rings and imply greater flexibility of the Lb heme pocket than of the Hb and Mb heme pockets. Greater flexibility might help explain the unusually high rates of CO and O_2 binding to Lb compared with rates of binding to Hb and Mb.

10:20 A NEW INSIGHT INTO DIRECTED VALENCE IN MOLECULES. H. Bradford Thompson, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606

A recently-published model of bond geometry and the stereoactivity of lone-pair electrons (J. Amer. Chem. Soc., 100, 7213 (1978)) provides a basis for new insights into directed valence. The model employs only one spatial dimension and a very simple potential function, and allows for very graphic approaches to the way in which the presence of one chemical bond leads to preferred positions for other bonds. This model has been used to predict the bond angle in water to within 0.5°, with similar accuracy in other small molecules. The model uses no electrostatic electron-pair repulsions, but relies for bond directivity on consequences of the Pauli exclusion principle. It thus provides a simple and graphic way of examining and discussing the role of the exclusion principle in directional bonding. Approaches to use of this model in teaching will be discussed.

10:40 Business Meeting

G. CHEMISTRY

FIRST AFTERNOON SESSION

Pfleiderer P3

THOMAS A. EVANS, Presiding

2:00 HAZARDOUS MATERIAL SPILLS. Gary F. Bennett, Ph.D., Professor of Biochemical Engineering, The University of Toledo, Toledo, Ohio 43606

Spills of hazardous materials are an inevitable result of a society dependent on highly developed technology that produces, ships and utilizes a myriad of complex and often dangerous chemicals. Extremely beneficial when utilized as intended, pesticides, chlorine and sulfuric acid, if mismanaged can cause environmental devastation and pose immense danger to public health.

Some of the most notable spills and their impact are reviewed. Recent legislation and regulations promulgated by EPA defining amounts of hazardous chemicals that have to be reported if spilled and penalties for spillage precede description of cleanup systems developed by industry and the government.

CHEMISTRY

2:30 ACCELERATED AGING OF FIVE CONTEMPORARY WATERCOLOR PAPERS. Dr. James W. Lacksonen, Associate Professor of Chemical Engineering, The University of Toledo, Toledo, Ohio 43606

Five watercolor papers commonly used today by watercolor artists were subjected to oven aging to simulate accelerated aging. The papers were tested by several physical tests commonly used today by the paper industry: brightness, Mullen burst strength, Elmendorf tear test, Instron tensile strength and the tensile energy absorption. Initial tests of the papers prior to accelerated aging included the above physical tests, Ph extraction, and energy dispersive X-ray analysis. The most sensitive test to measure the effects of aging was found to be the tensile energy absorption. The relative effect of aging on fiber-to-fiber bond strength and individual fiber embrittlement is postulated as a probable cause for the decrease in tensile energy absorption. Proper methods of storing and handling watercolors and prints done with these papers is of concern to museum curators and art collectors. These tests are designed to provide information related to the improvement of the permanence of papers used in art today.

2:50 **ACIDITY DETERMINATIONS IN COAL ACID MINE DRAINAGE WATERS**
Marc D. Porter, Shelley J. Coldiron, and G. Nicholas Kelble
Brehm Laboratory, Wright State University
Dayton, Ohio 45435

Acid mine drainage (AMD) waters cause several problems in the environment, due to their low pH and the contributing acidity (capacity to donate hydrogen ions) of their constituents. Specifically, the ions of interest because they are major contributors to acidity are iron, manganese, aluminum, and magnesium.

In order to determine the contributing characters of these suspect ions, an indicator titration using NaOH with the addition of H_2O_2 (for reproducible driving of reaction products to the same oxidation state) is performed in an attempt to develop a simple, non-technical method. The drawbacks of the conventional method become evident as the pH increases during the progression of the titration. Reaction propagation may occur through different, intermediate complexes and hence final products. The presence of insoluble reaction products, such as $Fe(OH)_3$, interfere with the detection of the endpoint.

This method can be used to estimate the total stream degradation due to AMD contamination.

3:10 THE pH OF NATURAL WATERS. Bruce V. Weidner, 326 Hughes Laboratories, Miami University, Oxford, OH. 45056.

A comparison of the pH of natural bodies of water in the North American Continent will be made with that of the South American Countries of Chile, Easter Islands, Ecuador-Amazon and Bolivia.

G. CHEMISTRY

SECOND AFTERNOON SESSION

Pfleiderer P4

Presiding Officer Pending

2:00 BINDING OF CROCETIN TO PLASMA ALBUMIN, Steven L. Willett and Theodore L. Miller, Department of Chemistry, Ohio Wesleyan University, Delaware, Ohio 43015.

An important function of plasma albumin is to bind long chain fatty acids which makes them more soluble in aqueous solutions. This is of physiological significance because albumin binds almost all of the free fatty acid (FFA) that is released into the blood from adipose cells. Therefore, albumin is the major vehicle for FFA transport through the plasma. Crocetin is a dicarboxylic acid that is a member of the class of terpene lipids called carotenoids. Crocetin and its interaction with albumin is of interest because a recent study has demonstrated that the intramuscular injection of crocetin in rabbits fed an atherosclerosis-producing diet, resulted in greatly reduced severity of the atherosclerosis. The fluorescence emission spectra of both bovine albumin and human albumin are altered when crocetin is added to the medium. The wavelength of excitation for both albumins was 283 nm. The fluorescence intensity was shifted and strongly quenched for both when crocetin was added. The shift in λ_{max} was small for both albumins, from 350 nm to 345 nm with excess crocetin. The extent of binding was evaluated using the decrease in relative luminescence intensity at 350 nm. A series of competitive binding experiments between crocetin and palmitic acid was used to illustrate that crocetin binds to the same plasma albumin sites as other long chain fatty acids. Our results strongly support the concept of configurational adoptability as an experimental model.

2:20 STOPPED-FLOW PHOTOLABELING OF COUPLING FACTOR 1-ATPASE
Frederick Hoover, Daniel J. Smith
Department of Chemistry, The University of Akron, Akron, Ohio 44325

A mechanism proposed for the light induced synthesis of ATP catalyzed by membrane bound coupling factor 1 (CF_1) involves a mandatory conformational change in CF_1. N-(4-azido-3-nitrophenyl)-2-amino ethyl sulfonate (NAP-Taurine) has been shown to be effective in nonspecifically labeling within microseconds membrane bound proteins in human erythrocytes. Its usefulness has been shown in hydrophilic nonspecific surface labeling of ribonuclease-A in detecting conformational changes.

Current work with NAP-Taurine demonstrates its effectiveness in surface labeling bovine serum albumin (BSA) at various protein and labeling agent concentrations and photolytic time intervals. BSA has been successfully labeled within time intervals of 10-20 sec. and by using a stop-flow apparatus within millisecond intervals. By incorporating NAP-(^{35}S)-Taurine as a labeling agent, membrane bound CF_1 has been successfully labeled within 10-20 sec. photolytic intervals. The extent of labeling of each subunit in CF_1 was determined by separating the subunits by polyacrylamide-SDS-gel electrophoresis and determining radioactive content of each subunit. Using a stopped-flow apparatus, CF_1 has been labeled within milliseconds, corresponding to the turnover time of CF_1. Comparative studies of the extent of labeling within each subunit of catalyzing and noncatalyzing CF_1 labeled under these conditions will determine the kinetic competence of the proposed conformational change in the structure of CF_1 in the catalytic mechanism.

2:40 **THE GUANYLATION OF TRANSFER RNA IN CHICKEN RETICULOCYTES. Judy Angelbeck and Ernest F. DuBrul, Biology Department, The University of Toledo, Toledo, OH 43606. A number of post-transcriptional modifications of tRNA have been described. One such modification involves the insertion of a single guanine residue internally into the completed polynucleotide chains of two specific tRNA's in rabbit reticulocytes. We now report the presence of this enzyme in chicken reticulocytes. This is the first report of it in a nucleated cell. When reticulocytes are incubated in the presence of ^{14}C guanine and actinomycin D, de novo RNA synthesis is inhibited. Nevertheless, ^{14}C guanine is incorporated into tRNA. When tRNA-free lysates of reticulocytes are incubated with ^{14}C guanine and heterologous (yeast) or homologous tRNA, the guanine label chromatographs as one major tRNA peak on RPC-5 columns. When chicken reticulocyte tRNA is fractionated on acetylated DBAE columns, the fraction that does not contain the putative Q or Q* base is enriched in substrate tRNA. When guanylated tRNA is fractionated on the same columns, the guanylated tRNA does not elute with the putative Q or Q* containing tRNA's. Thus, neither the substrate tRNA nor the product tRNA of the guanylation reaction is associated with Q-containing tRNA's in chicken reticulocytes. This finding is similar to the situation in rabbit tRNA where guanylated tRNA does not contain Q*. However, it is in contrast to the situation in E. coli tRNA where guanine is incorporated only into those species that contain the modified nucleoside Q in the anticodon. (Supported by grants from Research Corporation, the American Heart Association, Northwest Ohio Chapter, the American Cancer Society, Ohio Division, and Faculty Research Followship from the University of Toledo).**

3:00 TISSUE RESPIRATORY FACTOR AND AUTOXIDIZABLE COMPOUNDS IN YEAST EXTRACT (PCO) Nwanyinna Obi and Kinji Tanaka, St. Thomas Institute, Cincinnati,OH 45206

In our Institute Cook et al. found that yeast extracts (PCO) can stimulate skin respiration (manometric procedure) and antagonize the inhibitory action of basic phenylmercuric nitrate and cytochrome oxidase inhibitors such as cyanide on the respiration of skin. They suggested the presence of an autoxidizable substance(s) in PCO that may bypass the cytochrome oxidase system. Recently, Hunt et al. reported that PCO increased the oxygen consumption of cultured fibroblasts and verified its ability to antagonize cyanide but they found no intrinsic oxygen consumption by PCO. With the manometric method we confirmed that PCO can antagonize the effect of phenylmercury on rat skin. Using Hunt's method (Oxygraph) we found the presence of autoxidizable substances in reconstituted freeze-dried samples of PCO. Since PCO contains cysteine and glutathione, which are autoxidizable, and an unidentified sulfur compound, we have investigated the repiratory behavior of these compounds as well as ascorbic acid, hydroquinone, and PCO and its fractions.

3:15 THE SYNTHESIS OF NEW CR(III) PORPHYRIN COMPLEXES AND THEIR ^{51}CR LABELED CONGENERS. Dennis Riley. The Procter & Gamble Company, Miami Valley Laboratories, P.O. Box 39175, Cincinnati, Ohio, 45247.

A new synthetic procedure for the preparation of pure ^{51}Cr labeled Cr(III) porphyrin complexes is presented. The method makes it possible to synthesize such complexes on a small scale (10^{-8} mole) with high specific activities (5 μCi/μg). This method utilizes the oxygen-sensitive and kinetically-labile Cr(II) ion as the starting source of Cr. The general synthetic method reported here results in improved yields and greater purity for several previously reported Cr porphyrin complexes. The synthesis of several new Cr porphyrin complexes are also discussed.

H. SCIENCE EDUCATION

FIRST MORNING SESSION

Aigler A201

RUSSELL HANSEN, Presiding

8:15 STUDENT JOURNALS IN PHYSICAL GEOLOGY. F. W. Cropp, Department of Geology, The College of Wooster, Wooster, Ohio 44691.

Daily journal entires about geology have been required for students enrolled in sections of Physical Geology at The College of Wooster during the past five years. Student evaluations almost unanimously agree that the journal assignment, which comprises 20% of the grade in the course, has increased their awareness of the Earth and their interest in Physical Geology.

Students are required to write at least five times each week about observations made as a result of new material or new insights gained in the course, readings from books and articles on reserve in the library, questions that come to mind about the Earth, and text or lecture references to cycles in the Earth.

Communication between students and the instructor in classes of 60 to 115 students is greatly enhanced through reading the journals every two or three weeks during the 10-week term.

8:30 METRICATION - STATUS, METHODS, AND MATERIALS.

Presenter - Dr. Evan McFee, Science Education, Bowling Green State University, Bowling Green, Ohio 43403

Medicine, drugs, and many other consumer products are already described and sold with metric labels. Several major manufacturers have plans to go metric within the next ten years. What then has been the recent role of the federal government toward this movement and what has been underway with public education. Also, what methods and materials will enhance better teaching of the modernized metric system.

In familiarizing the educators and students with the nse of the metric system we need to develop methods that support positive attitudes and are successful in working with metric units of length, volume, and mass. We need to construct charts and visual aids that make switching to the different units an easy and workable process.

The recent demand for metric materials has generated a flood of expensive and sometimes inadequate products. Besides the expense, these products are often unsuitable for classroom use and are not related to the student's real world. As a result it is helpful to identify inexpensive materials that can be easily obtained by teachers and students that are meaningful and are common place items that start students "thinking in metrics".

8:45 THE USE OF PIAGETIAN LEVELS FOR SELECTION OF TEACHING STRATEGIES

Dr. C. L. Schrader
Dover High School
520 N. Walnut Street
Dover, Ohio 44622

The research is an effort to determine teaching strategies that can be used to enhance the learning of abstract science concepts by students who are still at the concrete operational level of intellectual development. The longest test of Piagetian Level was used to classify students as formal or concrete thinkers. The instructional material consisted of several concepts lessons, four of which were concrete concepts, and four were formal concepts. For each concept lesson, an achievement and a retention test was designed. The sex of the student was also considered as a variable on concept attainment and the research investigated the kinds of concepts for which cognitive style is an important variable.

9:05 ENERGY CURRICULUM FOR SECONDARY SCIENCE AND SECONDARY SCIENCE TEACHERS*

Dr. Joy S. Lindbeck
College of Education, University of Akron, Akron, Ohio 44325

Curriculum in secondary science must include a focus on energy alternatives and their political-social and economic ramifications. To present the curriculum on energy, secondary science teachers must acquire background knowledge.

From a survey of teachers in two school districts, energy topics were identified for an academic workshop on energy. Participants developed instructional packages each quarter on energy topics, presented and shared their experiences in implementing the packages. Participant evaluation of each quarter's presentation on a Likert-type questionnaire was supportive.

*Some or all of the materials incorporated in this work were developed with the financial support of the NSF Grant #77-13558

SCIENCE EDUCATION

9:20 ESTABLISHING POSITIVE ATTITUDES TOWARD ENERGY CONSERVATION IN INTERMEDIATE-LEVEL SCHOOL CHILDREN, Thomas A. Collins and Neil Herbkersman. The Institute of Environmental Sciences, Miami University, Oxford, Ohio 45056.

The purpose of this study was to establish positive attitudes toward conservation and wise use of our energy resources. Four hundred and fifty-five fourth, fifth, and sixth grade children participated in 18 learning activities in a fieldtrip setting. The activities were carefully designed to introduce and reinforce six key energy and environment principles. Prior to attending the fieldtrip, the children took a semantic differential survey to assess their attitudes toward energy conservation. Immediately following the fieldtrip, the children took a posttest to determine if any change in attitude had occured. The pretests and posttests were also taken by 53 control students who did not attend the fieldtrip.

Results indicated a signigicant, 17.5% shift in attitudes in a positive direction for the experimental group ($p < .01$); control group scores were not significantly different on the pretests and posttests. The change in attitude shown by the experimental group was independent of sex, grade-level, and community type.

9:30 ENERGY CONSERVATION AND SOLAR ACTIVITIES FOR THE CLASSROOM
Anne Settevendemie, 149 McGuffey Lab School, Miami University, Oxford, Ohio 45056

Presentation of a practicum project involving an energy conservation and solar energy unit tested with sixth graders. The unit includes hands-on activities dealing with energy sources, energy transfer, evidence of energy use, electrical energy measurement and insulation activities. Home energy conservation and practices are emphasized. Principles of solar energy are explored through simple activities (i.e. greenhouse effect). Students build and test a variety of solar collectors; flat plate water and air heaters, hot dog cookers, solar ovens.

The presentation includes slides of children involved in the energy activities, experimenting, constructing and testing. Student worksheets and directions for construction of solar projects will be distributed to participants.

9:45 MODIFICATION FOR A COMPOUND MICROSCOPE ENABLING HANDICAPPED WITH LIMITED DEXTERITY UNAIDED ACCESS. Napoletano, Thomas S. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

A Bausch and Lomb student microscope model ST-22 was modified by "pegging" the course and fine focus adjustment knobs. The pegging was accomplished by drilling and tapping the focal adjustment knobs. Screws with plastic sleeves were inserted at right angles to the direction of travel. This particular arrangement gave a mechanical advantage making the focal adjustment a less arduous task.

A mechanical stage was likewise drilled and tapped, but the "pegging" screws were inserted at an angle which expedited stage adjustment. The fairly complex lateral and perpendicular (x and y axis) movement of the stage can be handled quite readily by individuals with minimal dexterity.

These and other minor modifications to the microscope used in conjunction with some simple mouthpiece suction devices enable handicapped individuals to use a compound microscope unassisted.

10:00 TUNING IN TO BIOLOGICAL SCIENCES - Louise Van Vliet, Speech and Hearing Clinic, Miami University, Oxford, Ohio 45056

"Non Scientific" students can be turned on by science courses if the instructor relates the courses to the interests of the students. This presentation deals with techniques used in teaching human anatomy and physiology to individuals ranging from grade school age to adulthood. To be discussed are ideas for the following:

1) Development of study units for other classes, e.g. English, history, math and business. By applying biology in other classes, both disciplines benefit.
2) Development of study units and projects for biology classes. Projects demonstrated include flannel-board models, jig-saw puzzles, songs, anatomy books for children, cross-word puzzles, & anatomy coloring books.
3) Teaching anatomy by clinical application. Clinical application is not only of great interest to all students but serves as a way for educating individuals about physical handicaps.

Handouts will include copies of "Natomy News", a newspaper designed to make anatomy fun, literary sources, and project ideas.

10:15 CORTICOLOUS MYXOMYCETES OF THE NORTH HIGH SCHOOL LAND LABORATORY.

Karl Leo Braun, North High School, Springfield, Ohio 45503

Harold W. Keller, Wright State University, Dayton, Ohio 45435

When North High School was constructed in 1960, a fringe of forest composed of elm, ash, maple, oak, and hickory was left surrounding the school. In 1967 the National Audubon Society made a survey of the area and reported recommendations for an outdoor laboratory. Since that time the outdoor laboratory has been widely used by the North High School Biology Department and the Springfield School District.

At the beginning of this school year, students were given instructions to tag and identify trees in the land laboratory. Bark samples were collected from tree trunks and stored in plastic bags for later use in moist chambers in the indoor laboratory. Moist chambers were prepared containing tree bark and after incubation many types of organisms developed (algae, fungi, Myxomycetes, lichens, myxobacteria, liverworts, mosses, testaceans, nematodes and tardigrades). Special attention was given to the corticolous Myxomycetes. These studies revealed at least ten readily identifiable myxomycete species (Arcyria cinerea, A. ferruginea, Cribraria violacea, Echinostelium minutum, Licea kleistobolus, L. operculata, Perichaena chrysosperma, P. depressa, Physarum galbeum, P. pusillum). Ecological relationships between the corticolous Myxomycetes and the bark of the trees on which they developed will be discussed.

10:30 Business Meeting

H. SCIENCE EDUCATION

SECOND MORNING SESSION

Jointly Sponsored by the National Association of Geology Teachers and the Science Education Section

Aigler A202

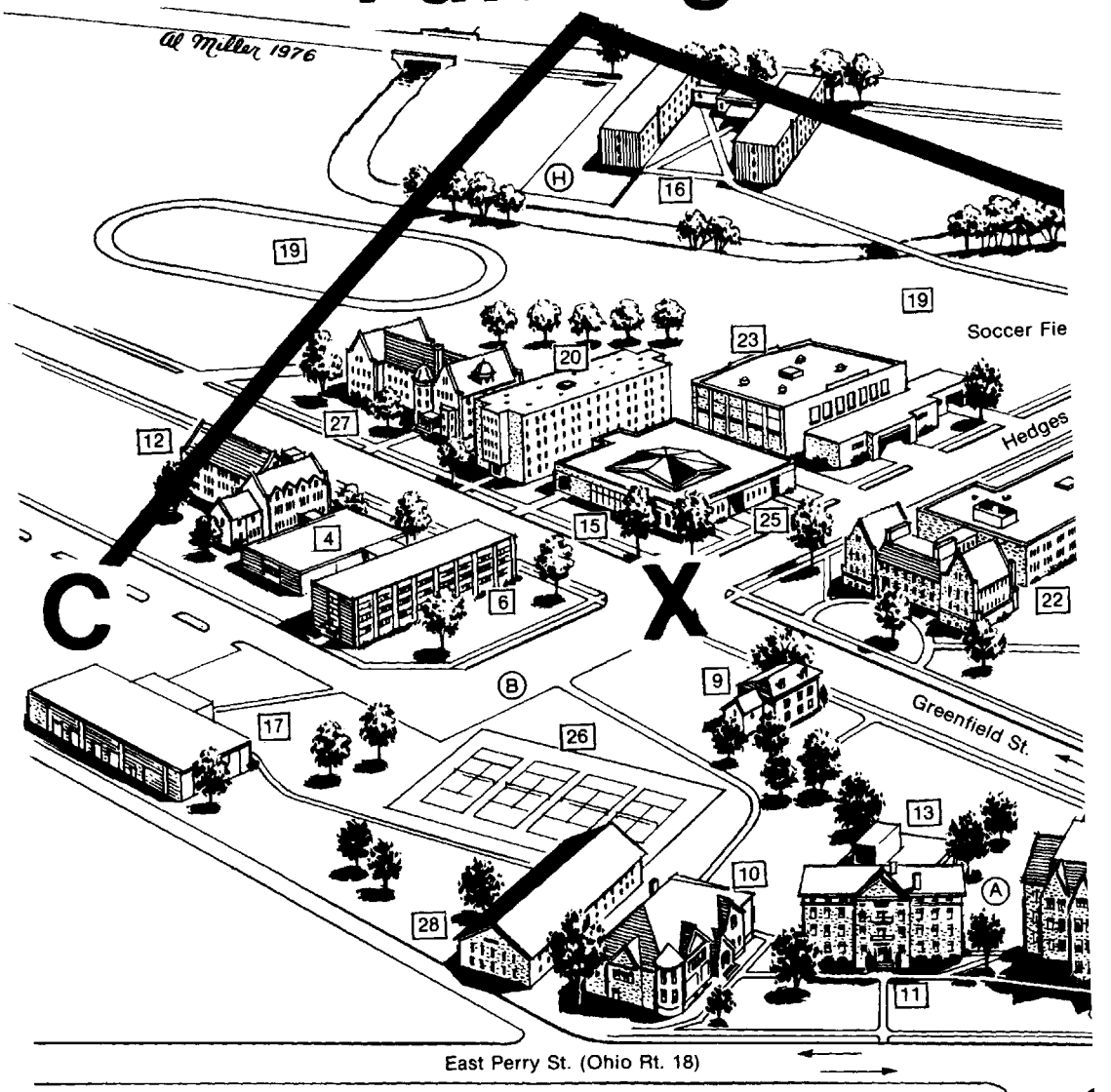
VICTOR MAYER, Presiding

8:30 WORKSHOP PROGRAM JOINTLY SPONSORED BY THE NATIONAL ASSOCIATION OF GEOLOGY TEACHERS AND THE SCIENCE EDUCATION SECTION OF THE ACADEMY

1. WORKSHOP ON THE CRUSTAL EVOLUTION EDUCATION PROJECT, Victor J. Mayer, Professor, The Ohio State University, Faculty of Science and Mathematics Education, 283 Arps Hall, 1945 North High Street, Columbus, OH 43210.

The Crustal Evolution Education Project of the National Association of Geology Teachers is just completing the development of 64 teaching modules for use in teaching earth science concepts to students at the middle school and junior high school level. Many of these modules are now becoming available through the publisher and the Journal of Geological Education. This one-hour long workshop will review the topics of modules that are available with suggestions on how they can be used by the teacher. There will be an opportunity for participants to preview at least one module.

Parking

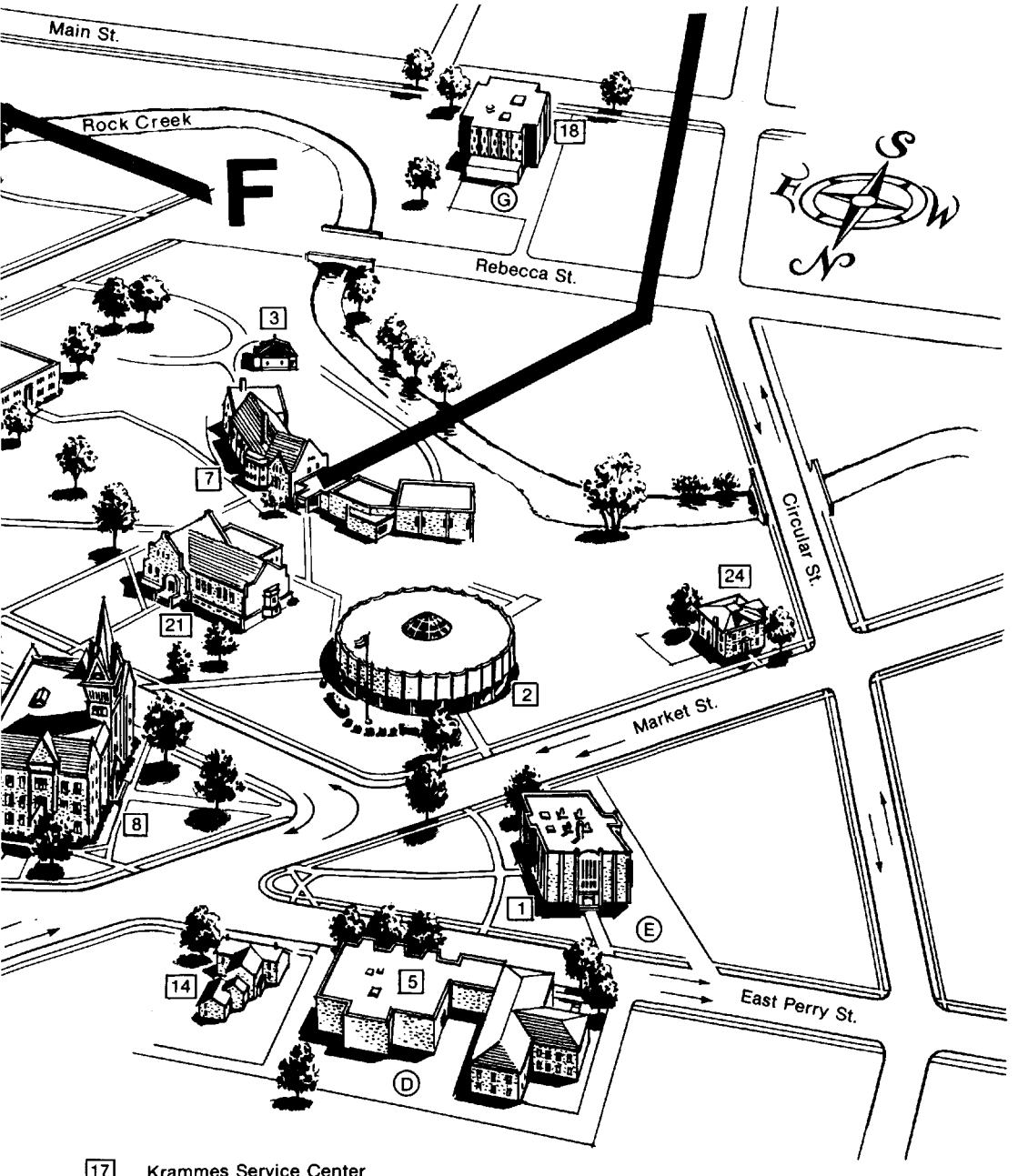


HEIDELBERG COLLEGE

TIFFIN, OHIO

1. Aigler-Alumni Building
2. Beeghly Library
3. Black Student Union Center
4. Bookstore
5. Brenneman Music Hall
6. Brown Residence Hall
7. Campus Center
8. College Hall
9. Development House
10. Fine Arts
11. Founders Hall
12. France Residence Hall
13. George P. Gundlach Theatre
14. German House
15. Hoernemann Refectory
16. King Memorial Residence

REGISTRATION



17 Krammes Service Center
18 Krieg Residence Hall
19 Mayer Field
20 Miller Residence Hall
21 Pfleiderer Center for Religion and Humanities
22 Science Center
Laird Science Hall
Bareis Hall of Science
Frost Lecture Hall
23 Seiberling Gymnasium
24 Social Science House
25 Stoner Health Center
26 Tennis Courts
27 Williard Residence Hall
28 Auxiliary Gymnasium

Ⓐ-Ⓗ Parking

9:30 WORKSHOP PROGRAM JOINTLY SPONSORED BY THE NATIONAL ASSOCIATION OF GEOLOGY TEACHERS AND THE SCIENCE EDUCATION SECTION OF THE ACADEMY

2. WORKSHOP ON LAKE ERIE RELATED TEACHING MATERIALS, Rosanne Fortner, Visiting Assistant Professor, The Ohio State University, Faculty of Science and Mathematics Education, 283 Arps Hall, 1945 North High Street, Columbus, OH 43210.

The Oceanic Education Activities for Great Lakes States is the first project of the education component of the Ohio Sea Grant Program. It is concerned with the development of interdisciplinary materials for the insertion of marine-related information into existing curricula at grades 5 through 9. Many of the activities that have been developed focus on earth science aspects of the Great Lakes, such as changing lake levels, the effects of lakes and oceans on climate, shoreline processes and ancient shorelines. Workshop participants will be presented with an overview of the materials and have an opportunity to work on one of the investigations.

10:30 Business Meeting in Aigler A201

H. SCIENCE EDUCATION

THIRD MORNING SESSION
Aigler A203
P. SWAMI, Presiding

8:30 SCIENCE LABORATORY SAFETY TRAINING PROGRAM
Piyush Swami, Science Consultant, Ohio Department of Education
65 S. Front Street, Columbus, Ohio 43215

Safety of students, staff, and property, being a main concern in science laboratories, the Division of Elementary and Secondary Education, Ohio Department of Education, has initiated a statewide effort to train science teachers in proper laboratory safety practices.

The program involves a review of procedures in the areas of eye and face protection, procedures for handling chemical reagents, storage and disposal of chemicals, labelling, handling glassware, biological and animal hazards, ventilation, fire control, laboratory hardware, and record keeping. In addition, special considerations are given to examine the laboratory needs, how to involve students in safety programs, and legal aspects of classroom safety.

An overview of this program outlining procedural details will be presented. Each person attending the session will be provided with a manual of instructional and review materials suitable for use in laboratory courses at all grade levels, college through elementary. The materials are designed so that individuals can use them to evaluate safety practices in any laboratory setting.

The availability of personnel to assist in organizing training sessions will be described.

10:00 THE CUYAHOGA VALLEY NATIONAL RECREATION AREA, OHIO'S LARGEST ENVIRONMENTAL STUDY RESOURCE. Mr. William C. Birdsell, Superintendent, CVNRA, P.O. Box 158, Peninsula, Ohio 44264. Dr. Jim L. Jackson, Director, Oak Hill Center for Environmental Studies, 3505 Oak Hill Road, Peninsula, Ohio 44264.

Cuyahoga Valley National Recreation Area (CVNRA) was established June 26, 1975, as the third major urban park administered by the National Park Service to bring parks to the people. Establishment of the 32,000 acre park required the concerted effort of many people. Development was rapidly engrossing the green open space between Akron and Cleveland. The National Park Service has acted rapidly to develop a management plan based on extensive public input and involvement. Land is 60% acquired. The potential diversity of park activities will be greater than for other similar-size areas of the National Park System.

The Oak Hill Center for Environmental Studies, located within the boundaries of the CVNRA, is jointly operated by the National Park Service and The University of Akron. Here, an Interuniversity Committee, comprised of individuals from eight colleges and universities, five public school systems, the Cleveland Museum of Natural History, NASA--Lewis Research Center, and the Ohio Biological Survey, assists the National Park Service in the coordination of research and environmental education activities. The center provides opportunities for scientists, educators, students, and special interest groups to work together. The center coordinates research and educational opportunities (several examples will be given) as part of the environmental studies program of the CVNRA.

10:30 Business in Aigler A201

H. SCIENCE EDUCATION

AFTERNOON SESSION, 1:30 P.M.

Joint Symposium Sponsored by the National Association of Geology Teachers and Sections C. Geology and H. Science Education of the Academy

Aigler A104

I. ANTHROPOLOGY & SOCIOLOGY

MORNING SESSION

Seiberling Gym Classroom

LYLE DARNAUER, Presiding

9:00 CLICHES: A SOCIOLOGICAL PERSPECTIVE. Stephen B. McConnell, University of Toledo, Department of Sociology, Anthropology and Social Work, Toledo, Ohio 43606.

The paper reviews a sociological study of cliches. Discussion originates with a definition of cliche and how it was produced. It is argued that cliches are social and thereby amenable to sociological analysis which transcends conventional linguistic investigations. Cliches are perceived as natural outgrowths of social life reflecting basic elements of social organization rather than pejoratively as constructions to be shunned. A content analysis of 150 associational speeches is assessed. This analysis focuses on the cliche phrases used which leads to a typology of cliches. Since the associations were of different status levels, observations are made about propensity to use cliches in relation to status (lower, middle, upper). Conclusions include the contention that sociology has long neglected serious study of language and that sociological inquiry into cliches produces insight into these ubiquitous phrases that roll off tongue and pen.

ANTHROPOLOGY & SOCIOLOGY

9:30 THE EXCAVATION OF FEATURE 1: WOLF LATE WOODLAND REMAINS AT PEARSON VILLAGE

Jonathan Bowen, Department of Archaeology, The Ohio Historical Society, Columbus, Ohio 43211

An area of 200 square feet was excavated at Pearson Village, a multi-component site in Sandusky County, Ohio. A Wolf Late Woodland feature, probably a ditch or gully filled with refuse, was encountered. Analysis of the material suggests that the economy was focused on the cultivation of beans and 8-row corn, fishing, and the hunting of cervids. Debris from a wattle and daub structure was recovered, as were lithic, ceramic, bone and shell artifacts. At least one pot was decorated with a painted design. The material suggests that this component represents a large permanent village.

9:45 ARCHAEOLOGICAL EXCAVATION OF THE GALBREATH MOUND, FRANKLIN COUNTY, OHIO. William S. Dancey. Department of Anthropology, The Ohio State University, Columbus, Ohio 43210.

The Galbreath Mound (33-FR-58) is a burial mound located west of Columbus on a bluff 60 feet above Big Darby Creek. Excavations in 1975, 1976, and 1977 produced artifacts typical of the Adena burial complex. The mound measures 16 meters in diameter and 1.4 meters high, and was found to contain three groups of skeletons located in contiguous, above-ground enclosures that may have been log-tombs. Several additional tombs are suspected to be present in unexcavated portions of the mound. A centrally located tomb containing at least three individuals formed the nucleus of the mound. It apparently was covered with earth and additional tombs built against it. A radiocarbon date of 2175±125 BP (UGa-1582) was obtained for a flanking tomb that contained at least twenty-five individuals. A stratigraphically later flanking tomb containing at least two individuals has been dated at 2025±80 BP (UGa-1581). The skeletons represent both males and females, of all ages; most were extended burials, but several flexed and bundle burials and several cremations were encountered. Information on the artifacts, the burials, and stratigraphy are presented in this paper.

10:05 ARCHAEOLOGICAL SURFACE INVESTIGATION OF THE PRATHER SITE, CLAIRMONT COUNTY, OHIO. Dee Anne Wymer. Department of Anthropology, The Ohio State University, Columbus, Ohio 43210.

The Prather Site (33-CT-300) is a multi-component prehistoric site located on the Ohio River floodplain 10 miles upriver from Cincinnati. Although some Ft. Ancient artifacts have been found on the site, its major occupation seems to have been during the Archaic Period. Surface investigations were conducted in 1977 to test the effectiveness of several techniques of surface survey and to determine to what extent spatial patterning was preserved in the surface exposed artifacts on the site. One of the surface collection techniques involved the placement of flags alongside artifacts that were found during systematic surface examination. This technique was found to be valuable in permitting an instant assessment of the surface limits and internal characteristics of the site. Internal structure was found to be preserved almost exclusively in fire-cracked rock distribution since manufactured items such as projectile points and scrapers had been removed by local collectors and chipped stone debitage had been dislocated by collector activity. In spite of the biases resulting from uncontrolled artifact collection, plowing, and erosion, it was possible to define site limits and to form some hypotheses concerning site structure.

A BIOCULTURAL STUDY OF THE DARBY CREEK ADENA. Robert Waterworth. Department of Anthropology, The Ohio State University, Columbus, Ohio 43210.

10:25

This paper is an account of the study of human skeletal remains from three prehistoric Adena burial mound groups located on the Big and Little Darby Creeks in Franklin County, Ohio. Using the Grewal-Smith statistic, the three skeletal populations were compared in terms of thirty-five epigenetic cranial traits to determine the degree of biological affinity between them. As was expected because of their geographic, temporal, and cultural closeness, the mound groups were found to be closely related biologically and it is concluded that the individuals represented belonged to a common gene pool. In addition to this analysis, data on the distribution of mortuary artifacts and burial types according to age and sex were examined to determine social characteristics of the Darby Adena population. The analysis suggests the existence of a non-egalitarian form of social organization.

10:40 Business Meeting

I. ANTHROPOLOGY & SOCIOLOGY

AFTERNOON SESSION
Seiberling Gym Classroom
T. NEAL GARLAND, Presiding

The Talking Tree: An Ethnographic Analysis of a Contemporary American Symbol. Karen Dasher, c/o William Leons, Ph.D., University of Toledo, Toledo, Ohio 43606.

1:00

This paper presents the results of an ethnographic study dealing with the impact of McDonald's Talking Tree on a randomly selected group of children between the ages of two and ten years. The site for this study was a McDonald's restaurant located in Sylvania, Ohio. Research was carried out between September and December, 1978. Age and sex differences in response to the verbal messages of the Talking Tree as well as to the Tree's physical presence were one focus of this study. The children's reactions to the Tree as well as to one another when relating to the Tree are examined in light of the theories of Freud, Levi-Strauss and Leach. Our methodology, largely based on the participant-observer approach, indicate that children not only listen carefully to what the Tree has to say, they respond verbally when the Tree asks them a question. If a group of children are at the Tree at the same time, a rigid, self-imposed pecking order based on age immediately establishes who is allowed to activate the Tree. Many children expressed a desire to eat not just the apples "growing" on the Tree, but to consume the Tree itself. Our data indicate there was a sex-based differential in the children's desire to touch the Tree; girls would caress and fondle the Tree while boys were openly hostile, striking and verbally abusing the Tree. While the Talking Tree was ostensibly designed by McDonald's as a simple sales-promotion technique, this study has shown that the choice of this particular symbol and the children's response to that symbol have definite sociological and psychological implications.

WHO BENEFITS IN MARRIAGE WITH RESPECT TO LONGEVITY, THE MALE OR THE FEMALE? Elias T. Nigem and Deanna J. Harwell, Department of Sociology, University of Toledo, Toledo, Ohio 43606.

1:15

The present study focuses upon the relationship of marital status to longevity as determined by mortality rates. To examine the hypothesis that males benefit more in marriage than females with respect to longevity, mortality rates by marital status and age for both White and non-White U.S. population were examined. The data showed that the married male gains more in terms of decreased mortality rates than the married female, and thus, lends some support to our hypothesis. This pattern existed among Whites and non-Whites, although the overall gain by White males was greater than that for the non-White. In addition, the percentage gain by males over females fluctuated substantially from one decade to the next.

ANTHROPOLOGY & SOCIOLOGY

1:35 WOMEN'S CHANGING ROLE AND POSITION IN A DEVELOPING COUNTRY: THE CASE OF LIBYA. El-Waheshy Biri, Department of Sociology, The University of Akron, Akron, Ohio 44325.

In the past the Libyan women's right to participate in the social, economic, and political affairs of the country was to a great degree denied, due to long established traditions and practices which were consistent with the approach and the outlook of the majority of the people. These traditions and restrictions of women's rights are now changing as a result of many factors. This paper analyzes the impact on women's roles of a number of these factors, including education, urbanization, changes in the economy, and the great changes in the political structure of the country since the 1969 revolution.

1:55 AN EMERGING PROFESSION? THE CASE OF THE NURSE PRACTITIONER. T. Neal Garland, Department of Sociology, University of Akron, and JoAnne M. Marchione, College of Nursing, University of Akron, Akron, Ohio 44325.

The 1960s and 1970s have witnessed the emergence of a new type of health care deliverer: the Nurse Practitioner. At present, the status of the Nurse Practitioner within the health care delivery system is highly ambiguous to the Nurse Practitioner herself and to other members of the health care team. Part of this ambiguity can be traced to the fact that it is not clear whether the Nurse Practitioner is solely a practitioner, or whether she qualifies as a health care professional. This paper explores several typologies that attempt to delineate the characteristics of a profession and assesses the attributes of the Nurse Practitioner in the light of such typologies. It is concluded that while the Nurse Practitioner presently does not meet all the criteria of professional status, there is some indication that this situation is likely to change in the near future.

2:15 PHYSICIANS, PATIENTS, AND SOCIAL PSYCHOLOGICAL DEATH. David Naylor, Department of Sociology, The University of Akron, Akron, Ohio 44325.

Medical patients with terminal diagnosis may perceive that friends, relatives and their attending physicians are increasingly redirecting interaction away from encountering an impending death and toward persons with more active and long-term interaction potential. When the doctor, in whom the dying patient may entrust hope and seek consolation, withdraws social contact in favor of more curable, treatment-responsive patients, the dying patient may become irreversibly depressed, define his/her medical situation as hopeless, and give up resisting biological death. Both physicians and sociologists contributing to the thanatological literature suggest that doctors may cause psychological death in such instances. A patient in this situation can begin to define himself as already "good as dead," and wish to die prematurely. To investigate this possibility, interviews were conducted with dying patients throughout the Greater Akron area. The interviews were designed to reveal the degree to which patients perceived social withdrawal by their doctors, the extent of depression which may have resulted from such perceived abandonment, and the degree to which variables like age, education, income, religiosity, and the state of the illness affect patients' ability to cope with perceived involuntary social withdrawal and resist self-imposed psychological death.

2:35 CONTRACEPTIVE BEHAVIOR AMONG ADOLESCENTS: A FERTILE FIELD FOR STUDY. Ronni Sterns, Department of Sociology, The University of Akron, Akron, OH 44325.

While birth rates for the over 20 age group have declined considerably during the past decade, the out-of-wedlock birth rates among adolescents have substantially increased. This trend among teenagers has not been offset by an increased use of the most effective contraceptives. The few existing studies of teenage contraceptive use have neglected girls under fifteen years old, males, longitudinal analyses as well as background variables such as SES, ethnicity and religion. Theoretical explanations regarding contraceptive use among junior and senior high school age individuals are largely inconclusive. This paper will review the significant trends in out-of-wedlock adolescent sexuality and contraceptive behavior, the major theories discussed in the literature and a pilot study designed to resolve some of the problems the literature presents.

2:50 AN ANALYSIS OF THE RELATIONSHIP BETWEEN EDUCATION AND AUTHORITARIANISM AMONG HIGH SCHOOL STUDENTS IN THE SOUTHWESTERN VIRGINIA SECTION OF THE CENTRAL APPALACHIAN MOUNTAINS. William J. Hauser, West Virginia University, and James K. Crissman, Department of Sociology, The University of Akron, Akron, Ohio 44325.

Few studies have focused on the degree of authoritarianism extant among high school students in the Central Appalachian mountains, or whether it increases or decreases as the amount of education increases. The present study investigates the relationship between education and authoritarianism utilizing a random sample of students (N = 565) in three high schools in the Southwestern Virginia section of the Central Appalachian Mountains. Regression and correlation techniques are used to examine the influence of education on authoritarianism, and the effects of such control variables as age, socio-economic status, religious preference, and county of residence.

3:10 A STUDY OF THE FAMILY TYPES AND RULES OF AUTHORITY OF CENTRAL APPALACHIAN MIGRANTS IN AKRON, OHIO. James K. Crissman, Department of Sociology, The University of Akron, Akron, OH 44325.

Much attention has been focused on the social problems created by Appalachian migrants in the city, but few attempts have been made to study the family types and rules of authority of Appalachian migrant families in the urban milieu. The present study is devoted to an analysis of the family types and rules of authority of a sample of Central Appalachian migrant families in Akron, Ohio. Also, utilizing family background as the independent variable, family types and rules of authority as the dependent variables, and 16 control variables, the sample of Central Appalachian migrant families are compared statistically with a sample of Non-Central Appalachian urban families in Akron, Ohio. The test of significance utilized in the study is Chi-Square and the measure of association is Lambda.

3:30 EPISTEMOLOGICAL DILEMMAS IN THE SOCIOLOGY OF SCIENCE: AN OVERVIEW OF SOME ISSUES AND POSSIBLE SOLUTIONS. Rick Aniskiewicz, Department of Sociology, The University of Akron, Akron, OH 44325.

This paper is based on the belief that models of scientific growth and change are implicitly tied to epistemological assumptions. Merton's "normative-structural" model and Kuhn's "paradigmatic" model of science are examined in terms of their epistemological foundations. The problems of "positivism" (Merton) and a "fallibilist epistemology" (Kuhn) are reviewed. It is argued that some of the epistemological dilemmas can be overcome if sociologists make distinctions between types of scientific inquiry and types of scientific questions. These crucial distinctions should make it clear that a "monolithic" view of science (e.g., a view that stresses the "unity of scientific method" despite differences in the content of scientific disciplines) is detrimental to the development of the sociology of science. A more flexible view of science allows one to conceptualize the important distinctions between each discipline, while also maintaining the integrity of each discipline.

3:50 ROLE PLAYING Elizabeth Monks, Department of Sociology, University of Akron, Akron, OH 44325

One of the goals of sociology is to study and investigate two types of human interaction: social cooperation and social conflict. This paper investigates social cooperation, or interpersonal harmony, and focuses on roles and role playing. While the scope of this topic is great, little has been done to delineate the common ground shared by questions arising from the discussion of roles and role playing.

The purpose of this paper is to investigate two major questions: 1) To what extent does "trying out" different roles increase tolerance, empathy, and positive attitudes toward others, resulting in increased interpersonal harmony? 2) What effect does role playing have on interpersonal relations?

Discussion focuses on the conclusion that assuming another individual's roles aids in being sympathetic to and developing a positive attitude toward that person's situation by forcing one to view the situation in a similar manner. Much can be learned by observing how an individual's views affect that person.

4:10 RITUALS AND RELATIONSHIPS: A COMPARATIVE APPROACH TO THE STUDY OF SYNAGOGUE LIFE Allan Wolf Department of Sociology Univ. of Akron, Akron,Ohio 44325

This paper is concerned with the relationship between ritual behavior and social interaction within an orthodox and conservative synagogue in Cleveland Ohio. The analysis explains how these organizations react to contemporary secular life through the preservation, elimination, or redefinition of particular rituals. Through the methodological approach of participant observation and the theoretical approach of symbolic interactionism this paper explains how ritual observance or the lack of, enhances or detracts from social interaction. It is found that various rituals are used to preserve a sense of community whereas the modification or loss of specific rituals weakens social cohesion. Various processes are used by both synagogues in attempting to prevent disintegration on an institutional, communal and spiritual level.

J. CONSERVATION

MORNING SESSION
Bareis Hall B101
JOSEPH D. KASILE, Presiding

9:30 THE HAZEL WILLIS WOODS - A DYNAMIC LANDSCAPE
Oliver D. Diller
1368 E. Wayne Ave., Wooster, Ohio 44691

This 40-acre tract in Mifflin Township, Ashland County, Ohio was purchased by Walter and Hazel Willis in 1946 because they wanted to satisfy their interests in nature study. The area consisted of 18 acres woodland, mostly maple; 12 acres pasture land; and 10 acres under cultivation. The open land was reforested with red and white pine, black locust, and tulip tree in the early 1950's.

An intensive inventory now in progress shows that rapid plant succession has taken place during the past 32 years. Preliminary data on the area surveyed to date show that 9 tree species out of 29 constitute 75% of the total number of trees.

The forest floor contains over a dozen species of ferns and extensive colonies of Lycopodium. Since 1946 the owners have observed over 50 resident species of birds.

Goals for future management are in process of formulation. The owner is wondering whether it is possible to manage a woods intensively and profitably for wood production and yet maintain the rich diversity of flora and fauna he has observed during the past 32 years. He is concerned about the environmental impact of logging on plants in the forest floor and future use of the area for nature study.

9:45 ENVIRONMENTAL EDUCATION IN OHIO: WHAT'S HAPPENING? Rhea K. Copening, The Ohio Alliance for Environmental Education, 445 King Avenue, Columbus, Ohio 43201.

In May, 1975, The Ohio Academy of Science established the Environmental Education Committee for the purpose of developing strategies for moving environmental education ahead in Ohio. The major recommendation of the committee was to establish a nongovernmental entity to articulate Ohio's needs for environmental education. The organization that resulted from this recommendation is The Ohio Alliance for Environmental Education which was established in May, 1977. The purpose of the Alliance is to promote environmental education in Ohio by fostering coordination and communication among groups engaged in environmental education activities.

Ohio is richly endowed with environmental education programs, both formal and nonformal. The Ohio Alliance for Environmental Education has been actively involved in identifying what these programs are, where they are taking place and what trends, if any, are being established. These topics will be presented as well as a discussion of future efforts to further the goals of environmental education.

10:00 MODULAR POROUS BREAKWATERS, by S. Sarikelle and G. Mavrigian, The University of Akron, Akron, Ohio 44325

The novelty of modular porous breakwaters, consisting of pre-fabricated interlocking concrete slabs and circular supports, possesses potential as efficient hydraulic structures for water wave attenuation. Wave transmission and reflection coefficients are significantly influenced by wave steepness and also by geometrical parameters as orientation of argyle wall sections and spacing between multiple walls. Applications extend to the design of small harbors and analysis of harbor areas with severe problems with currents and sedimentation.

10:15 CRITERIA FOR TRAIL DEVELOPMENT
Dan Ross, 2736 6th Street, Cuyahoga Falls, Ohio 44221

Since the National Trails Act (P.L.-90-543) passed in 1968, there has been a national concern for trail development and usage. There are principally eleven types of trails - hiking, canoe, water, driving, biking, horseback, interpretive, ORV (off-road vehicle), skiing, snowmobiling and trails for the handicapped. This paper will deal with the criteria for soil ratings for foot and horseback trails. Soils are rated in three degrees of limitation - slight, moderate and severe. Six soil properties are evaluated which affect the degree of soil limitations. The soil limitation should form the foundation for making decisions on trail development. But, there are other factors to consider such as safety and philosophy of the trails.

10:30 Business Meeting

J. CONSERVATION

AFTERNOON SESSION
Bareis Hall B101
DONNA L. T. SZUHY, Presiding

1:00 Your Community's Future: Choice or Chance?
Special Film Will Be Presented. No Abstract.

1:45 Symposium: The Local Government Planning and Development Act

Honorable Kenneth R. Cox and Mr. Larry Long
State Senator Association of County Commissioners
28th District

K. GENETICS AND CELL BIOLOGY

MORNING SESSION
Pfleiderer P104
HAROLD H. LEE, Presiding

9:30 GENETIC CONTROL OF DROSOPHILA MELANOGASTER HEXOKINASE. Baumann, James L., and W. L. Bischoff, Department of Biology, University of Toledo, Toledo, Ohio 43606

Drosophila melanogaster contain a family of electrophoretically discernable hexokinase isozymes which function in the phosphorylation of glucose and fructose at the carbon six position. Although some sex and organ specificity has been shown, little is known about their genetic control. A reliable spectrophotometric assay showing good linearity between enzyme concentration and measured activity has been developed. Maximum activity occurs at pH 8.5 with optimum concentrations of glucose, fructose and ATP being $5x10^{-2}M$, $5x10^{-1}M$, and $5x10^{-3}M$ respectively. Apparent Michaelis-Menten constants are: glucose, $.796x10^{-4}M$; fructose, $20.9x10^{-4}M$; ATP (glucose), $2.1x10^{-4}M$; ATP (fructose), $3.8x10^{-4}M$. Segmental aneuploidy mapping shows at least two chromosomal regions (50C-52E and 101A-102F) that exhibit a significant increase in fructose specific activity in hyperploids. No glucose specific dose responses were observed. Kinetic and electrophoretic studies suggest that the observed increases are due to changes in the relative proportions of various hexokinase isozymes in aneuploid flies. Developmental studies indicate total activity with both glucose and fructose is highest in mature adults with minor peaks in freshly laid eggs and 90-hour larvae. Glucose and fructose specific activities develop in a coordinated fashion with glucose activity always higher than fructose activity. Male glucose activity per unit protein is higher than female activity while female fructose activity per organism is higher than in males.

9:45 RESTRICTION ENDONUCLEASE MAPPING OF AVIAN MTDNA: STRUCTURE AND EVOLUTION. K. R. Glaus, N. S. Fechheimer and P. S. Perlman, Dept. of Genetics, The Ohio State University, Columbus, Ohio 43210

Restriction endonuclease fragment analysis of mitochondrial DNA (mtDNA) from a variety of animals has revealed considerable primary nucleotide sequence divergence among individuals from closely related species and among individuals within a species. Intraspecific polymorphism has been observed in all animals examined comprising sheep, goats, rats, mice, horses and man. The existence of such polymorphisms in mtDNA restriction patterns raises questions and facilitates studies of the function and, inheritance and evolution of mtDNA in animals. We are interested in the mtDNA of another animal species, the domestic chicken, and have begun our studies by screening lines of domestic fowl for restriction pattern differences. The restriction patterns of mtDNA from 11 birds representing 6 different commercial and non-commercial lines have been determined. Identification and physical mapping has been made of 21 restriction enzyme sites on chicken mtDNA with 6 different enzymes. Homogeneity in restriction patterns was exhibited by 10 birds from 5 different lines. One bird in a sixth line has a variant Eco RI restriction pattern, presumably arising from the loss of one Eco RI restriction site. In order to learn more about the origin of this variant line of birds, and the evolution of chicken mtDNA, the restriction fragment maps of other closely related gallinaceous birds are being examined. Major differences in the restriction fragment patterns of chicken and turkey mtDNA have been found. Analysis of jungle fowl, pheasant, guinea fowl, and quail are being made.

10:00 ISOLATION AND BIOCHEMICAL CHARACTERIZATION OF OLIGOMYCIN-RESISTANT MUTANTS OF ACANTHAMOEBA CASTELLANII. Jeffrey J. Seilhamer and Thomas J. Byers, Department of Microbiology, 484 W.12th Ave., Columbus, Ohio, 43210.

Spontaneous mutants of Acanthamoeba castellanii resistant to 15 µg oligomycin (Oli) /ml were isolated using both bulk selection and individual clone isolation. The mutants are phenotypically stable during vegetative culture in the absence of the drug and are drug-specific. Mutant frequencies were quantitated using a multiwell tissue-culture plate assay system: roughly one in 10^5 cells from wild-type populations were able to grow in the drug by 15 days.

ATPase levels in mitochondrial preparations obtained from wild-type and Oli^R cells were measured using the Fiske-Subbarow assay for phosphorous liberated from ATP. ATPase activity from both cell lines was stimulated by Mg^{++}, Ca^{++}, Ni^{++}, Zn^{++}, and Co^{++} but not by Na^+, K^+, or NH_3^+. Activity using ADP, AMP, and p-nitrophenol-PO_4 as substrates was negligible, indicating a pure ATPase. Activity from WT cells showed significantly more inhibition by 0.1-1.0 µg Oli /ml than did equivalent extracts from Oli^R cells. These results suggest that the Oli^R mutation is at the level of the ATPase enzyme.

10:15 QUANTITATIVE CHANGES IN WHOLE CELL, NUCLEAR, AND MITOCHONDRIAL DNA DURING ENCYSTMENT IN ACANTHAMOEBA CASTELLANII. Louis E. King and Thomas J. Byers, Department of Microbiology, OSU, 484 W.12th Ave., Columbus, Ohio, 43210

Whole cell DNA content decreases about 50% in Acanthamoeba castellanii during encystment. Microspectrophotometric measurements of feulgen stained nuclei show this decrease is not in nuclear DNA (nDNA). When DNA from cells prelabelled with ^{3}H-thymidine was isolated at various times during encystment and separated into nDNA and mitochondrial DNA (mtDNA) by isopycnic centrifugation, it was found that mtDNA lost about 50% and nDNA lost less than 10% of the initial radioactivity. Quantitative fluorescent measurements of isolated mtDNA and nDNA plus measurements of ^{3}H-thymidine specific radioactivity in mtDNA and nDNA of control and encysting cell populations suggest that Acanthamoeba castellanii has enough mtDNA to account for most of the loss of DNA seen during encystment. These results contrast with earlier findings showing mtDNA accounts for only a small fraction of the total cellular DNA.

10:30 Business Meeting

K. GENETICS AND CELL BIOLOGY

AFTERNOON SESSION
Pfleiderer P104
C. WILLIAM BIRKY, Presiding

1:30 AN ANALYSIS AT TWO TEMPERATURES OF THE DIFFERENCES BETWEEN TWO LINES OF DROSOPHILA MELANOGASTER HETEROZYGOUS FOR THE HAIRLESS MUTANT (H/+) AND SELECTED FOR INTERMEDIATE AND LOW DEGREES OF INTERRUPTION OF THE FOURTH LONGITUDINAL VEIN (L_4). Verl L. House. Department of Genetics, The Ohio State University, 1735 Neil Ave., Columbus, Ohio 43210.

At 22°C two H/+ stocks, L and I, are characterized in females and males respectively by following penetrance values for L_4 interruption: 0.8%, 0.0% and 15.9%, 8.3%. At 28°C, these values become: 23.2%, 1.7% and 95.3%, 41.9%. BCI, F_1, F_2, and BCL progeny at 22°C are characterized by the following penetrance values for females and males respectively: 0.8%, 0.0%, 3.7%, 0.8%, and 0.8%, 0.0%, 0.0%, 0.0%. The distribution of L_4 presence for I females at 28°C is essentially normal with a mean of 67.7%. This suggests that vein-forming ability is distributed normally but truncated at a threshold for maximal effect. Interpreting the more penetrant truncated distributions at 28°C in this manner, the following estimates can be made of the BCI, F_1, F_2; BCL, and L means in females: 70.75, 75.27, 83.91, 86.29, and 118.03. Observed BCL and F_2 means are not significantly different from those expected on an assumption of additive effects of the modifying differences separating the two lines. The BCL mean differs significantly from the expectation. L males at 28°C are essentially non penetrant, but an estimate of 113.56 for the mean of this genotype can be derived from F_1 and BCL means and an assumption of additive effects. Using this mean and those for the F_1 and I genotypes, the additive expectation for the F_2 mean can be calculated and is not significantly different from that observed. There is also no significant difference between the estimated and observed BCI means in males.

1:45 GENETIC VARIATION IN RECENTLY PLANTED POPULATIONS OF ANDROPOGON SCOPARIUS (LITTLE BLUE STEM). Daphne D. Lambright[1] and Sheldon I. Guttman[2], Department of Botany[1] and Department of Zoology[2], Miami University, Oxford, Ohio 45056.

In 1974 a program was established to determine which stock seed types and what methods of ground preparation would result in the best establishment and production of selected prairie grass species including Andropogon scoparius. The plots were treated in two different manners and seeded with both Northern and Southern seed stocks.

Two plots were sampled. Horizontal starch gel electrophoresis was used to determine the allelic composition of Little Blue Stem at each plot, four years after the original seed was applied. Samples of the original seed stock were germinated and the plants assayed electrophoretically to determine any changes in frequency of specific alleles.

2:00 THE LURIA-DELBRUCK EXPERIMENT AND THE ORIGIN OF A YEAST MITOCHONDRIAL MUTANT CELL James S. Backer, Department of Genetics, The Ohio State University, Columbus, Ohio 43210

The Luria-Delbruck experiment (Genetics 28:491) was the first evidence that bacterial mutations arose prior to the selective treatment rather than after the selective treatment. This demonstrated that the mutation resulted from a change in the hereditary material rather than a physiological response to the selective treatment. Baker's yeast (Saccharomyces cerevisiae) mitochondrial mutations, also, result from a change in the hereditary material, yeast mitochondrial (mt) DNA. But there are about 50 copies of mtDNA/cell and it is not known how a cell with a single mutant mtDNA molecule can produce a cell homozygous for the mutation. I used the Luria-Delbruck experiment to determine whether homozygous resistant cells can be produced without exposure to the antibiotic: the results show that most cannot, in agreement with other observations (Dujon, 1975, Molec. Gen. Gent 143:131, Birky, 1974, Genetics: 421). There are several hypotheses to explain the results; the most attractive is selection for resistant mtDNA molecules within the population of molecules in the cell. As a control, yeast nuclear mutations were investigated. The results indicate that nuclear mutations do arise prior to the selective conditions, as expected. (Supported by USPHS grant GM19607)

2:15 ACETATE REQUIRING MUTANTS OF CHLAMYDOMONAS REINHARDTII. Robert J. Spreitzer. Department of Biology, Case Western Reserve University, Cleveland, Ohio, 44106.

Some acetate requiring mutants were found to be moderately sensitive to light in preliminary selection experiments. A more permissive protocol was adopted to insure the recovery of acetate requiring mutants with even greater sensitivity to light. Previously reported enrichment protocols, which must be carried out in the light, would not detect some of these mutants. Wild type cells are grown in 1mM 5-fluorodeoxyuridine (to promote the recovery of uniparentally inherited mutants; Shepherd et. al., J. Cell Biol. 75: 308a, 1977) in the dark, mutagenized with ethyl methanesulfonate, and then allowed an expression time prior to plating on acetate medium in the dark. Acetate requiring mutants are selected, without enrichment, following replica plating to minimal medium at 4000 lux. Mutants are obtained at a frequency of 1×10^{-3} and can be characterized by sensitivity to light, as well as by deficiency of green pigmentation in the dark(eg. yellow, brown). Of the 5 pigment deficient acetate requirers selected, all are light sensitive and inherited in a Mendelian pattern. All 10 of the uniparental mutants show some degree of light sensitivity. Of the remaining normal pigmented, Mendelian mutants, 65% are light sensitive. Biochemical analysis is in progress to discriminate between mutants with defects in photosynthetic electron transport and the carbon metabolism pathways of photosynthesis. One of the objectives of this work is to develop a screening procedure to identify mutants in carbon metabolism, including structural gene mutants of ribulose-1,5-bisphosphate carboxylase.

2:30 GENETICS OF PHAGE GROUP 2 STAPHYLOCOCCUS AUREUS. S.M. Martin,* and M. Rogolsky. Microbiology Dept., Ohio State Univ., Columbus, Ohio 43210, and Biology Dept., Univ. Missouri-Kansas City, Kansas City, Mo. 64110.

We have utilized DNA-mediated transformation to study the genetics of the phage group 2 strain UT0017 of Staphylococcus aureus. Both homologous and heterologous crosses were performed. The medically-important strain UT0002-19, which produces exfoliative toxin and causes "scalded skin syndrome" in man, served as donor in the latter case. Resistance markers in both strains were isolated using antibiotic gradient plates. Nitrosoguanidine mutagenesis, sometimes coupled with penicillin enrichment, was employed to obtain auxotrophs of strain UT0017. A method for isolating biologically active DNA from both strains was devised. A transformation regimen, employing 80α as helper phage in the presence of calcium cations, was developed. Maximum competence of UT0017 occurred during early logarithmic growth in trypticase soy broth, but cells grown overnight on heart infusion agar were also competent. Three genetic linkage groups were identified on the UT0017 chromosome. The first linkage group was thy4-lys5-trp21-thr4, the second was pyr26-nov9-his3, and the third consisted of ilv9 and pen1, a genetic determinant for β-lactamase synthesis. Transformation of the locus for exfoliative toxin production from strain UT0002-19 into the nontoxinogenic strain UT0017 could not be detected.

3:00 AN N LOCUS MULTIALLELE MODEL FOR GENE SUBSTITUTION. Donald O. Koehler, Barbara L. Whitten, Thomas G. Gregg, Miami University, Oxford, Ohio 45056.

The conceptual conflict between a slow series of gene substitutions as the mechanism of evolutionary change, and the apparent need for rapid and coordinated changes at many loci simultaneously in producing complex adaptations and rapid speciation is discussed. To improve upon the limitations of classical theory and accommodate the enormous amount of variability disclosed by electrophoretic studies we develop a model that can deal with gene substitution at n loci with numerous alleles at each locus. We treat fitness somewhat differently than is usual by allowing it to vary between zero and the number of offspring that an individual of a particular species can produce. As maximum fitnesses, we chose 5 as a typical of large mammals, 100 for insects like Drosophila, and 1000 for very prolific species. When our model is applied to the classical problem of determining the number of generations required to change P_A=.0001 to P_A=.9999, (but for 1000 loci rather than one), we find that it requires 22,899 generations when maximum fitness is 5, 7,984 generations when maximum fitness is 100, and 5,333 generations when it is 1000. This is something of an improvement over the 300,000 generations calculated by Haldane. The result of allowing varying proportions of the populations to inbreed was calculated for the n locus model. The effect on the classical problem was to reduce the number of generations by as much as 50%. We also point out that given the large amount of genetic variation that has been observed, evolutionary change may not be so much a matter of classical gene substitution as it is of changing from one array of alleles to another.

GENETICS AND CELL BIOLOGY

3:15 IN VITRO INCORPORATION OF LEUCINE INTO PROTEIN IN NORMAL AND MALNOURISHED BRAIN TISSUE. Mary Frances Grady[1], Judy Angelbeck, and Ernest F. DuBrul, Biology Department, University of Toledo, Toledo, OH 43606. Neonatal malnutrition reduces brain growth by reducing the normal increase in cell number. The reduction in brain size is much less than the size reduction of other organs. In order to understand the molecular mechanisms which underlie this "sparing effect", we have examined the incorporation of leucine into protein during the neonatal period in brains from normal and protein undernourished rats. This has been carried out in an in vitro system to avoid systemic alteration of ^{3}H-leucine, to control the extracellular leucine pool, and to produce proteins of high specific radioactivity. Our results verify that there is no appreciable difference in protein content of the cerebellum and cerebrum between the two groups of rats. We have also found that the pattern of leucine incorporation over the first neonatal 23 days is region specific. However, the rate of incorporation of leucine into TCA insoluble material by malnourished tissue is greater than the rate of incorporation by normal tissue. The newly synthesized proteins have also been compared by SDS/PAGE and fluorography. The paradox presented by these data, i.e., an increased rate of leucine incorporation (protein synthesis) but no increase in the amount of protein, will be discussed. Three possible mechanisms to explain this paradox are: 1) increased protein degradation rates in the malnourished brain tissue, 2) a larger intracellular pool of leucine in the normal brain tissue, and 3) a decreased metabolism of leucine to other molecules in the malnourished tissue. (Supported by Faculty Research Award/Fellowship[1] from University of Toledo and grant from the American Cancer Society, Ohio Division, to E.F.D. [1]Student in NSF Summer Research Project, University of Toledo.)

3:30 ENDOCYTIC MECHANISMS OF DIGESTIVE CELLS OF HYDRA VIRIDIS AND SEA ANEMONES. Clayton B. Cook and Theresa C. Gordon, Department of Zoology, The Ohio State University, 1735 Neil Ave., Columbus 43210.

The digestive cells of coelenterates are adapted for the uptake of both particulate material and of soluble macromolecules from the digestive cavity. In H. viridis, these cells surround the gut cavity and contain at least two recognizable uptake mechanisms. Pseudopodial microvilli effect the uptake of large food particles and algal cells; this process is limited by the availability of membrane. Soluble material is taken up by discoidal coated vesicles which may represent a membrane recycling phenomenon. The digestive/absorbtive cells of acontiate sea anemones (Aiptasia pallida, A. tagetes, Bartholomea annulata) are located on lateral edges of mesenterial filaments. These cells take up large particulate material by pseudopodial microvilli which resemble those of hydra. We have not observed discoidal vesicles as such in these cells; pinocytic uptake involves vesicles which more closely resemble pinocytic vesicles of mammalian cells than the discoidal vesicles of hydra. (Supported in part by an NSF grant to the Bermuda Biological Station).

3:45 SHORT TERM TOXICITY TESTING OF CHEMICALS USING CULTURED ANIMAL CELLS. M. T. Wininger, F. A. Kulik and W. D. Ross, Monsanto Research Corporation, 1515 Nicholas Road, Dayton, Ohio 45407.

An *in vitro* cytotoxicity test has been developed that is a rapid, inexpensive, and sensitive method of screening large numbers of samples to determine health and environmental effects. The assay responds well to various samples such as organic and inorganic chemicals and complex environmental samples. From the test results obtained, good correlation has been made with live animal tests to accurately predict the potential toxicity of a substance.

4:00 EVIDENCE FOR RANDOM DRIFT OF ORGANELLE GENE FREQUENCIES IN ZYGOTES OF SACCHAROMYCES, CHLAMYDOMONAS, AND PELARGONIUM. C. William Birky, Jr., Dept. of Genetics, The Ohio State University, Columbus, Ohio 43210

Mitochondria and chloroplasts have their own sets of genes on molecules of mtDNA and cpDNA, respectively. These are inherited autonomously from nuclear genes, and according to different rules. Organelle gene inheritance is studied by following pairs of alleles determining antibiotic resistance/sensitivity (yeast mtDNA, Chlamydomonas cpDNA) or green/white chloroplasts (geranium). There are many molecules of mtDNA or cpDNA per cell; organelle genetics is thus a problem in intracellular population genetics. There is evidence for repeated rounds of random pairing and recombination (gene conversion) of mtDNA in yeast and cpDNA in Chlamydomonas; also mtDNA of mouse cells is replicated randomly. These and other known or hypothetical features of organelle gene behavior could result in a random drift of gene frequencies in the population of molecules in a heterozygous zygote, analogous to random drift in Mendelian populations. Evidence for drift comes from plotting frequency distributions of gene frequencies in individual zygote clones or plants: the distributions are often U- or L-shaped. Also the organelle gene populations in many individual zygotes become fixed for one allele or the other. When a heterozygous zygote divides, organelle genes segregate to produce homozygous progeny cells in which random drift can no longer take place. Delaying cell division in heterozygous zygotes increases variance and the proportion of zygotes fixed for one allele, as predicted, in yeast and Chlamydomonas. (Supported by USPHS grant GM19607)

L. MATH AND COMPUTER SCIENCE

MORNING SESSION
Pfleiderer P103
EDWIN BRATHWAITE, Presiding

9:30 MODELING HEAT TRANSFER TO IN-SITU COAL FROM SELECTED SOLVENTS. By Fred Ku Fong and Duane R. Skidmore, Department of Chemical Engineering, Koffolt Laboratories, The Ohio State University, Columbus, Ohio 43210.

A complex heat transfer problem is solved numerically. The problem involves solvent flowing in a cylindrical channel embedded in a medium with a moving boundary. Three nonlinear conjugated differential equations describe the system. The equations are the heat balance equations for the medium and for the solvent, and the boundary equation, The boundary velocity and the coefficients of the defining equations were considered to be temperature-dependent. A new numerical method was devised to solve these three differential equations simultaneously. The numerical method consists of a combination of two stable methods, namely the ADI iteration method for the parabolic equation and the alternating variable method for the hyperbolic equations. Combined, these two methods are well suited to the solution of nonlinear equations in general, and give very fast convergence. Usually, two iterations give satisfactory results.

The simulation procedures have been applied to five coal solvents: anthracene oil, ammonia, CO/steam, supercritical toluene, and caustic solutions. Based on the results of the calculations, it was concluded that: 1. Within five minutes, the outlet solvent temperature of a 15m channel is 5°C less than the inlet solvent temperature (500°C), and the boundary temperature is 10°C less than the inlet solvent temperature. This implies that the heat loss from the solvent through the coal seam via thermal conduction is negligible. 2. Low Coal Conductivity is critical.

MATH AND COMPUTER SCIENCE

9:45 DRAG FORCE OF OBJECTS IN MUDDY WATERS, by Dr. H. Pazwash, The University of Akron, Department of Civil Engineering, Akron, Ohio 44325

Clay is one of the most common sediment materials carried by rivers, especially during floods, and is also found as the main constituent at the bottom of estuaries, lakes, oceans, etc. When mixed with water, clays exhibit a non-Newtonian behavior closely identifying a Bingham plastic fluid. The parameters for such a fluid yield stress, τ_y and plastic viscosity μ_p, are found to depend on the suspension's concentration and pH as well as clay particle size.

Drag force experiments on simple shaped objects such as sphere, cylinder and flat plate indicate the dependence of drag coefficients, C_D on not only Reynolds number (as in Newtonian fluids) but also a new parameter, P. This parameter can be referred to as Pazwash's number, and is given as $P=\rho V^2/2\tau_y$ in which ρ and V are flow velocity and fluid density, respectively.

The occurrence of yield stress shows that the Newtonian drag coefficient is increased by an amount inversely proportional to the parameter P. This increase can be very significant at small P numbers; however, with an increase in P, the difference becomes smaller and eventually diminishes. Moreover, this effect is larger for blunt objects than streamlined ones.

Further, a relation between the increase in drag and the P number with slenderness ratio of the objects is suggested. Since the bodies tested cover a wide range in this ratio, the results provide useful information in regard to movement of arbitrary shaped objects in muddy rivers.

10:00 FLOW RATE FROM PRESSURE DROP--AN EQUATION FOR ALL REGIMES. Dr. Lawrence G. Focht Department of Chemical Engineering, The University of Akron, Akron, Ohio 44325

An equation is presented for calculating the friction factor, f, from the Karman Number, $Re\sqrt{f}$, with pipe roughness, ε/D, as a parameter. The equation is valid for all flow regimes. The friction factor defined is equal to one-half the Fanning friction factor.

$$f = \left[\left(\frac{8}{Re\sqrt{f}}\right)^{24} + \frac{1}{(A+B)^{1.5}}\right]^{\frac{1}{12}}$$

where $$A = \left[2.457 \ln\left(\frac{1}{\frac{0.888}{Re\sqrt{f}} + \frac{0.27\varepsilon}{D}}\right)\right]^{16}, \text{ and } B = (2.665\times10^{-5} Re\sqrt{f})^{9}$$

The result was obtained by combining equations representing the laminar, transition and turbulent regimes into a single expression. A similar equation for the friction factor as a function of the Reynolds number has appeared in the literature. However, the result presented here is advantageous when it is desired to calculate flow rate from friction loss non-iteratively. The equation can be programmed on a hand-held calculator.

10:15 DEVELOPMENT OF A B.S. DEGREE CURRICULUM IN COMPUTER SCIENCE AND ENGINEERING. James B. Farison, Dean of Engineering and Donald J. Ewing, Jr., Chairman of Computer Science and Engineering Program, The University of Toledo, Toledo, Ohio 43606

A new program in Computer Science and Engineering (CSE) has been developed and implemented by the College of Engineering at The University of Toledo. The program was planned to meet the following conditions: 1) provide a computer degree curriculum of interest to students, with foundation for employment or graduate study, 2) meet the computer curricula recommendations of ACM and IEEE, the engineering accreditation criteria of ECPD, and the educational requirements for licensure of the Ohio Board of Registration, 3) build on but not compete with existing activities in electrical and industrial engineering, mathematics and business departments, 4) maintain academic standards and budgetary costs at levels sufficient for approval of Engineering faculty, University faculty senate and administration and Ohio Board of Regents, 5) offer service courses to other programs and part-time employees for campus needs, 6) utilize a flexible and economical organization structure, and 7) meet the needs of public and private employers.

With planning that dates to 1970, the present initiative began in 1975 and resulted in final approval and implementation in 1978. Curricular requirements, together with development experiences and first-year enrollments, represent evidence of the degree of success in meeting program goals.

L. MATH AND COMPUTER SCIENCE

AFTERNOON SESSION
Pfleiderer P103
RONALD WALKER, Presiding

1:30 DECISION ANALYSIS FOR ENVIRONMENTAL MANAGEMENT: AN APPROACH TO CHOICES AMONG MULTIATTRIBUTED ALTERNATIVES WITH INTANGIBLE COSTS AND BENEFITS

R. S. Brockwell, Institute of Environmental Sciences, Miami Univ., Oxford, OH45056
S. B. Friedman, School of Applied Science, Miami University, Oxford, OH 45056
A. E. Harvey, Computer Services, Norfolk & Western Railway Co., Norfolk, VA

Environmental policy decisions tend to involve choices which are of the most complex level. Because there is no market value for most of the items (i.e. clean air), methods which assign intangible cost and benefits should be applied. Also these decisions must deal with many attributes as the independent variables and in some cases there will be multiple objective functions.

This paper reviews the techniques available to the environmental decision maker and gives examples of their application. There are two main areas covered: (1) assignment of value, and (2) finding acceptable decisions. The approaches for assigning value discussed are multiattribute utility theory and the reciprocal matrix method. The methods covered for finding acceptable decisions are decision trees, analysis of hierarchies, and goal programming.

2:00 VECTOR MAPPING & DECISION THEORY APPLIED IN THE SOCIAL SERVICE FIELD

S. B. Friedman, School of Applied Science, Miami University, Oxford, OH 45056
J. Gahris, Environmental Protection Agency, Columbus, OH

A decision made by a public social service agency relative to increasing and stabilizing its income sources was examined using a new modelling technique. This technique separates tangible and intangible costs and benefits. By mapping these individually on an n-dimensional space, the integrity of the individual parameters are maintained, and controversial quantification in terms of monetary units is minimized.

The technique involves the use of multi-attibute utility theory, the reciprocal matrix method, decision trees, analysis of hierarchies, and n-dimensional mapping.

2:30 THE USE OF MICROCOMPUTERS IN BUSINESS AND SCIENCE COURSES

William R. Riter, Department of Business Administration,
Cedarville College, Cedarville, Ohio 45314

The Department of Business Administration and the Department of Science and Mathematics previously used a Teletype terminal connected by phone lines to an outside timesharing service. While primarily used for teaching Basic and Fortran, the system was also used for survey analysis and a variety of demonstrations.

In 1977 the feasibility of using a microcomputer for teaching Basic was explored. After the first system proved to be reliable but unable to handle the increasing demand, two additional systems were purchased. Fortran has recently been added to the systems.

The results have been extremely favorable. Student interest has increased. Cost per hour has decreased. Except for the terminal equipment, maintenance cost has been very low.

The systems include the following equipment: three Altair 8800B microcomputers, Pertec floppy disk drives, Teletype 33ASR terminals, Hazeltine 2000 video display terminal, and Decwriter II terminal.

One system will be demonstrated during this session.

3:00 Business Meeting

M. PSYCHOLOGY

MORNING SESSION

Laird Hall L303

ROBERT GANDEE, Presiding

9:00 THE TEACHING/LEARNING PROCESS: STATE OF THE SCIENCE. Ralph F. Darr. The University of Akron, Akron, OH 44325.

Recently noted authorities in educational research (J. Brophy, L.T. Frase, N.L. Gage & E. Guba) have suggested that educators need to rethink the methods employed in the study of the classroom teaching/learning process and the utilization of data gleamed from such studies. A more naturalistic approach is required.

Studying of the teaching/learning process must focus on three variable clusters: 1) teacher characteristics, 2) student characteristics, and 3) instructional characteristics.

Traditional student evaluation of instructors have identified characteristics students prefer in their teachers. Recent research has focused on other criterion measures. R.Y. Dayton (1978) investigated the relationship between instructor personality and the personality of academically successful students. Otis (1977), Pather & Smith (1976), and Vecchio & Costin (1977) studied differences in instructor characteristics across departments.

Studies of alternative forms of instruction have enabled researchers to look more closely at micro-factors which influence learning. Abbot & Falstrom (1977), and others have investigated the influence of procedural variations in PSI. Andrews (1978), and others studied variations within the problem solving model. Chickering (1977), et.al. analyzed the relationship between individual differences and success in PSI.

Quite clearly there is much to be done in studying the teaching/learning process; however, methods and data are available.

9:15 COMPARISON OF PERCEPTUAL-STYLE PERFORMANCE BETWEEN CHILDREN AND OLDER ADULTS. Sue Stoner & Paul E. Panek, Department of Psychology, Eastern Illinois University, Charleston, Ill. 61920.

It was the purpose of this study to investigate differences in perceptual-style ability of children and older adults when controlling for intelligence. Subjects were 75 females placed in one of three groups on the basis of their chronological age, Group 1, age 5 to 7 years (n=25), Group 2, age 8 to 9 years (n=25), and Group 3, ages 70 to 75(n=25). All subjects were administered the Children's Embedded Figures Test and the WAIS or WISC-R vocabulary subtest. Analysis of covariance indicated that there were significant age differences in perceptual-style performance after the effects of intelligence were partialed out. These findings indicate that the observed age differences in perceptual-style performance of many past studies cannot be dismissed as being due primarily to intelligence between groups.

9:30 THE PLAYBOY/PENTHOUSE GENRE AND FEMALE IDENTITY: AN ANALYSIS OF THE RESPONSES OF 147 FEMALES TO A MEDIA QUESTIONNAIRE. Judith A. Reisman and Barbara Van Eseltine, 13769 Cedar Rd., Apt. #301, So. Euclid, Ohio 44118

The question of a healthy identity is fundamental to the ability of the individual to achieve self validation. A major component of self validation is a view of the self as "good", that is, a valued and able human. Part of this self evaluation is the acceptance and valuing of self, inclusive of one's body. This survey examined the body image of 147 female respondants, both readers and non-readers of the Playboy/Penthouse genre, as well as subject's attitudes toward these magazines inclusive of models within the genre. The results of the survey seem to indicate a strong female preference for larger than average breasts, smaller waists and hips, and a significant belief that males prefer such a female body stereotype as well as "youthful" females, 29 years of age or less. The data, gathered from the questionnaire responses as well as in depth interviews, seems to confirm a generally negative evaluation of self within the survey population. Additionally, there are indications that those "readers" of the Playboy/Penthouse genre possess a significantly higher degree of body self depreciation. It is the authors' belief that the future study which focuses upon the effects of sexually explicit images upon females, should yield important results relative to contemporary female identity.

9:45 EFFECTS OF DIFFERENTIAL TREATMENT OF SPASMODIC AND CONGESTIVE DYSMENORRHEA. R. Rosenthal; W. Rosenthal; S.D. Spaner; & E.B. Fisher. Psychology Dept., Washington University, St. Louis, 63130.

This study investigated three treatments for menstrual (congestive dysmenorrhea) and premenstrual (spasmodic dysmenorrhea) problems: deep muscle relaxation, systematic desensitization, and nondirective groups. The study also investigated a new questionnaire, the Menstrual Symptom Questionnaire (MSQ), which purports to differentiate between women with congestive and spasmodic symptomatology. Thirty-one women, matched for age and MSQ scores, were randomly assigned to one of the three treatment groups. Dependent measures were the Menstrual Distress Questionnaire (MDQ), State-Trait Anxiety Inventory (STAI), a semantic differential, and the Mood Adjective Check List (MACL). After a 7 week baseline period, subjects met in one of the three treatment groups once a week for five weeks. Final testing was 7 weeks after treatment. Women catagorized as spasmodic or congestive by the MSQ selected significantly different desensitization hierarchies, supporting the proposal that there are two separate types of menstrual problem. For all the women anxiety was lowered on the second day of the menstrual period. An unexpected finding was that the Nondirective group had a significant increase in "arousal" or positive activation, both during periods and intermenstrually. No significant difference were found between the groups on negative symptoms. However, trends for the desensitization group to report the lowest level of negative symptomatology after treatment conformed to expectations of differential treatment effects. Contrary to findings in previous studies, there were no significant interactions found between STAI and treatment or between type of dysmenorrhea and treatment.

10:00 SEX ROLE EXPECTATIONS OF CLASSROOM TEACHERS, GRADES 1 THROUGH 12: ANDROGYNY OR STEREOTYPES? Carolyn R. Benz, 1325A 37 St. NE, Canton, OH 44714

Some data indicate a decline in academic achievement the longer females are in school while the reverse seems to be true for males. The extent to which teachers stereotype by sex may produce an expectancy effect that differs for male and female students. Expectancies for male and female students at the early grades may reflect the "feminine" environment of the school. That teachers in the secondary grades may have a less "feminine" (quiet, compliant, dependent) perception of the good student may encourage a set of expectancies that differ from the elementary grades. The investigator attempted to determine if teachers have sex-stereotyped expectations and if those expectations vary by grade level taught. Whether achievement level (high or low) affected teachers' sex role expectancies was also examined. Whether or not a changing pattern of sex role expectancies for the female student paralleled the changing achievement patterns was an important part of the study. The investigator surveyed the sex role perceptions of various hypothetical students of 168 classroom teachers, grades 1 through 12.

10:15 HOSPICE AS A STRUCTURAL-FUNCTIONAL COPING MECHANISM. David M. Bass, Department of Sociology, The University of Akron, Akron, Ohio 44325.

In recent years the term "stress" has received a great deal of attention from both laypersons and professionals. In spite of this, there has been little consensus as to what stress is or what causes it. There is, however, one life event which has been generally considered stressful. This event is the death of a family member or the knowledge that one's own life is in danger. Hospice care systems have been developed to act as structural-functional coping mechanisms for persons with life threatening illnesses, their family members and their health care providers. However, there has been little agreement over what services should be included in a hospice. This paper develops a list of potential needs of persons affected by life threatening illnesses. By concisely defining the possible needs associated with this life event, it will enable present and future hospice systems to most effectively assist with the stress of death.

PSYCHOLOGY

10:30 "Expansion of Services to Parents of Critically Ill Infants as Guided by Theoretical and Empirical Literature." Jon V. Thomas, 2200 High Street, Apt. 858, Cuyahoga Falls, OH 44221.

Anticipatory grief is a reality for parents of critically ill infants. At the time of transfer to regional intensive care facilities, the parents face the possibility that their infant may not survive. Several authors, Lindemann, Parkes, Fulton, Kennell, Kaplan and Mason, and Benfield have written about the effects of the grief situation on the individual. Several identifiable symptons are commonly cited; crying, depression, preoccupation with thoughts of the baby, disbelief, guilt, anger, anorexia, irritability, sleep disturbance, and sadness. These symptoms have served as guides to the investigation of grief and anticipatory grief.

Benfield, in particular, has made suggestions, from his research on the parents of the critically ill infant, about the changing role of the hospital with these parents. Parents are frequently frustrated by traditional visiting policies, phone call policy, and mother preference for room and roommate. At The Children's Hospital of Akron, these policies have been changed to alleviate these frustrations and meet the needs of the individual parent. These changes also necessitate changes in the role of the health care providers to one of a more understanding and caring role. Questionnaires relating to the needs stated above can help in identifying the needs of a particular hospital.

10:45 DEATH ANXIETY AND COPING STYLES: COMPARISON OF THE TEMPLER AND ALPHA-OMEGA MEASUREMENT SCALES. Smith, Pamela J.; Diann C. Callahan, Dr. Isadore Newman, Patrick R. Maloney, Faye H. Dambrot, Dr. Harvey Sterns. Department of Psychology, The University of Akron, Akron, OH 44325.

Comparisons were made between the Templer Masked Death Anxiety Scale (1970) and the Alpha-Omega measurement scale of adaptational approaches to stressful events (LaCamera, et.al., 1978). Both measurement scales were collapsed into a single testing instrument. The 25 subjects were nursing home personnel (15 Controls, 10 Experimentals). Both groups received pre and posttests; Experimentals completing a training program designed to alter their subjective attitudes toward death, which are related to personal stress. It was hypothesized that the Training group would have significantly different posttest scores on the Alpha-Omega scale, indicating that their coping styles had been enhanced via the training experience. In addition, scores on the Alpha-Omega were not expected to correlate well with the Templer scores, as each seems to measure a different construct. Results supported this hypothesis. The Pearson Correlation Coefficient was computed between scores on each of the Alpha-Omega subscales and between total Templer scores and each subscale score. All subscales appeared to have adequate internal consistency, and none correlated well with Templer scores. T tests were conducted on all computed variables. As measured by the Templer (total score), no differences in anxiety were detected between pre and post measures. Response scores on Alpha-Omega subscales of Anger and Acceptance were significantly different on the posttest for the Training group. Other variables showed either no change or a change in the expected direction. Implications were discussed.

M. PSYCHOLOGY

AFTERNOON SESSION
Laird Hall L303
ISADORE NEWMAN, Presiding

1:30 THE ISSUE OF MENTAL ILLNESS AS IT RELATES TO COMPETENCY TO STAND TRIAL

In order for a person to be competent to stand treial, it is important that he/she have sufficient cognitive and affective resources at their disposal to ensure the fact that they can assume the role of the defendent within a courtroom, the perron legally would be deprived of their right to due process under the law. Therefore, the examining psychiatrist and/or psychologist must make a determination as to whether the person being examined would be capable of maintaining an effective presence within the court. Thus, the key issues that must be examined by the assessment person/team are as follows: 1) Is the individual able to understand and appreciate the nature of their charges and the possible consequences; 2) Is the individual able to comprehend the fact that the trial proceeding is an adversary process which has a number of significant courtroom figures acting out designated roles (e.g., judge, jury, witnesses, defense counsel, prosecutor, etc.); and, 3) Is the individual able to cooperate with their legal counsel in their own behalf. In the final analysis, the examiner must believe that the individual will be adequately protected prior to entering the courtroom in order to ensure the fact that the person will obtain a fair trial. The presenter will examine the important issues that must be considered when making a final determination with an individual that has been referred by the courts for a competency to stand trial evaluation.

Ronald Jack Klein, Cheif Forensic Psychologist, Western Reserve Habilitation Center

2:00 THE EVALUATION CHAIN IS ONLY AS STRONG AS ITS MOST OVERSTRESSED LINK, William V. Rubin, M.A., Office of Program Evaluation and Research, Ohio Division of Mental Health, Columbus, Ohio 43215.

A social service organization or system can be viewed as being in a condition of stress when program evaluation efforts are mandated by internal or external sources. The task of evaluation places stress both on systems and people within these systems. This paper considers the various types of stress placed on links of the evaluation chain within a social service organization. The links include the organization director, the evaluator, and data collectors (clinicians, fiscal persons, data equipment, etc.). The causes of stress include need for survival (director), role ambiguity (evaluator), data request overload (data collectors), need for interpretations and recommendations (evaluator), and expectations for change (director). The results of these various stresses can include refusals and/or confrontations, passive resistance, system breakdowns and exodus from system. However, this author feels that moderate stress is a requirement for the system to function cognitively and emotionally. Based on personality theories of George Kelly, Donald Fiske and Salvatore Maddi, the system needs to constantly ask itself new questions (evaluate itself) and must have a moderate amount of stress for optimum functioning. Maintaining moderate tension, but preventing overload, may be a critical factor in the introduction of evaluation to a system and the success of the evaluation effort.

2:30 EVALUATION OF EXERCISE PROGRAMS AS RELATED TO WELL-BEING
Robert N. Gandee, University of Akron, Akron, Ohio 44325

The evaluation of exercise programs and their impact on the "whole" individual is a problem that confronts those involved in the promotion of optimal health and well-being. Conflicting opinions concerning the benefits of exercise are found in the literature. This presentation will emphasize the major issues and their respective rationale. Additionally, the crucial question that remains is, "How much exercise is enough?" For any one individual, the answer to this question is complex. A model for evaluating the immediate and long-term effects of exercise will be discussed. Various demonstration models and associated procedures in a variety of organizations will be contrasted. It is the contention of the author that in order for exercise programs to achieve maximal influence, they must make a concerted effort to individualize the exercise protocol to meet the capabilities and needs of each participant. This approach will enable the evaluator to access the contribution of exercise in the multifactored concept of "well-being".

PSYCHOLOGY

3:00 NUTRITIONAL PATTERNS AND THEIR RELATIONSHIP TO PHYSICAL AND PSYCHOLOGICAL WELL-BEING: AN INTERACTIVE MODEL

John Vitina & Tom Hranilovich, The University of Akron, Akron, Ohio 44325

Researchers interested in the physical and psychological correlates of various nutritional patterns have traditionally utilized either of two basic research strategies. Laboratory studies have focused on a limited selection of nutrients and have treated nutritional deficits in relative isolation from socioeconomic factors such as age, sex, race, and income level. Field surveys, while considering both socioeconomic and nutritional factors, have emphasized single-path models of analysis. Such models facilitate the search for direct cause-effect relationships but tend to obscure the interactional relationships that most probably exist among variables. Conclusions concerning the relationship of nutritional patterns to physical and psychological well-being which are based on either strategy may be inadequate and misleading.

A multi-path model describing both direct and interactional relationships among socioeconomic factors, nutritional patterns, and physical and psychological health is presented. The utility of the model is discussed, emphasizing its application to the increased integration of research and intervention programs and to the development of training programs for practitioners.

3:30 THE EVALUATION OF SOCIAL PROGRAMS: A COMMUNITY PERSPECTIVE

Robert Deitchman, University of Akron, Akron, Ohio 44325

Many projects have, along with their stated goals, a section devoted to program evaluation. Unfortunately, one major component which could assist that evaluation has to a large extent been ignored – the consumers of the service. The following paper will present several alternative models for involving the recipients of the services in the development of an adequate program evaluation. In addition, a discussion of the possible reasons for the demonstrated resistance to the development and implementation of these models will be presented. A demonstration model, using one of the suggested alternative techniques, will be discussed. It is the contention of the author that no longer can the schism exist between the consumer of service and the evaluators of those funding these programs.

4:00 Business Meeting

N. JUNIOR ACADEMY

FIRST MORNING SESSION

College Hall C206

All three morning sessions will start at 8:30 a.m. A final revised program with specific times will be available at the Registration Desk at 8:00 a.m. A Business Meeting is set for 1:30 p.m. in College Hall C206.

CONSTRUCTION AND APPLICATION OF LIGHT COMMUNICATIONS SYSTEMS UTILIZING A PULSE-FREQUENCY MODULATED GALLIUM-ARSENIDE LASER AND AN AMPLITUDE-MODULATED HELIUM-NEON LASER

James Ayers 10702 Ramm Road Whitehouse, Ohio 43571

This paper covers the design, construction, and application of two light communications systems. The first system employs pulse-frequency modulation of a galliumarsenide diode laser operating at room temperature. Two types of transmitters are described, with one employing a silicon-controlled rectifier, and the other using a common switching transistor being operated in the avalanche mode. Two specialized receivers for this system are also discussed. The second system utilizes an amplitude-modulated helium-neon laser. The laser modulator in this system uses a pentode and ten discharge lamps. The receiver for this system is a specialized audio amplifier developed by the author.

Several applications for these systems are described. Line-of-sight communication with and without lens systems was performed by the author, as well as systems with fiber optics. The possibility of multiplexing is discussed also. Performance will be evaluated separately for each system. Oscilloscope monitoring was used extensively for this purpose.

In conclusion, all phases of development of two light communications systems are covered. Depicted are the design of each system including each transmitter and receiver. Also, construction and selection of components is discussed, as well as applications of the finished products. Lastly, performance of each system is evaluated, and areas for improvement are suggested.

CORTICOLOUS MYXOMYCETES ON MEXICAN TREE BARK. Marie Appleby, North High School, 701 East Home Road, Springfield, Ohio 45503

Moist chambers have been made containing tree bark found in Mexico in order to study the development of corticolous Myxomycetes. Several species have been found on Mexican bark. Among these are included Cribrarea violacea, Echinostelium minutum, and Echinostelium arboreum.

An attempt is being made to culture (spore to spore) Echinostelium arboreum in the laboratory. The medium will be made from agar and an extract from the bark on which the Myxomycete was originally found. Also discussed will be work done to develop a chemically defined medium on which the Myxomycete may be cultured in the laboratory.

IDENTIFICATION OF AMINO ACIDS IN GLYCINE MAX SEEDS AND COMPARISON WITH AMINO ACIDS IN HIBISCUS ESCULENTUS PODS

Norine K. Barnes
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Socorro, N.M. 87801

The entire okra pod was investigated for its amino acid content, and compared with those amino acids recovered from soybean seeds. One variety of okra (Clemson - Spineless) and one variety of soybean (Attika) were used throughout the research. Analysis of the amino acids was made by one dimensional, ascending chromatography. Two essential amino acids were obtained from the soybeans. The total quantity of the amino acids obtained, however, was similar. The data was also statistically evaluated. No definite conclusion could be drawn because not all amino acids are liberated by a solvent system containing a 3:1 ratio of glacial acetic acid and ethanol. More research on this topic to establish which might be more beneficial to man is recommended.

JUNIOR ACADEMY

THE PRODUCTION OF ORGANIC COMPOUNDS UNDER SIMULATED MARTIAN ENVIRONMENTAL CONDITIONS. Samuel Beloff, North High School, 701 East Home Road, Springfield, Ohio 45503

Using techniques proposed by Drs. Stanley Miller and Melvin Calvin in their earlier research on the production of organic compounds in the primitive atmosphere of the Earth, I shall study the production of organic molecules under simulated Martian environmental conditions.

I shall discuss the results of passing 12000 volts of electricity through a mixture of carbon dioxide and water vapor in a closed glass system (after Calvin) and also the results of passing the same voltage through a mixture of water vapor, carbon dioxide, and nitrogen (after Miller). The apparatus used and the procedures followed in simulating the Martian atmosphere will be discussed in detail. Experiments have also been performed to determine if Earth-type life can survive under simulated Martian environmental conditions, as determined by NASA in their Viking program.

MEMORY TRANSFER IN PLANARIA Lisa Carrier, 325 Parmely Avenue, Elyria, Ohio 44035

Memory transfer has long been a topic of great controversy, especially in an organism as primitive as a planarian. Even if one believes that memory transfer of this kind is possible, much more controversy arises as to what makes this transfer possible.

The purpose of my research is to substantiate any feasible memory transfer processes and to investigate a possible explanation for this phenomenon. Using the species Dugesia dorotocephala, the subjects were trained to respond to light-shock conditioning. This is done by associating a mild shock with light until the planarian will cringe at the onset of light alone. When a planarian cringes 23 out of 25 times, conditioning is complete.

Through my experimentation, I have found several types of memory transfer methods to exist. Memory transfer through cannibalism is achieved by feeding a trained planarian to an untrained planarian. Regeneration is done by bisecting a trained planarian and allowing it to regenerate. Both the head and tail regenerates are then tested. Third generation memory transfer involves bisecting a trained planarian on two separate occasions. Four planaria will result, two with no tissue from the original planarian. Through these experiments, I have found each planarian to retain a remarkable portion of the original training.

Since research seems to indicate that RNA has some connection with the memory process, I regenerated a planarian in ribonuclease to try to erase the memory. These tests were inconclusive because of complications in preparing ribonuclease, however, the test is now being repeated under better conditions.

HOLOGRAPHY: THEORY AND PRACTICE. William J. Elicson, 866 Oakridge Drive, Boardman, Ohio 44512

The purpose of this research was to gain theoretical and practical knowledge of holography and, in the end, to produce actual holograms. Extreme stability was necessary for good results and, hence, a massive base of 1000+ kg was used to support the elements of the set-up(laser, mirrors, beam splitters, lenses, etc.) A stability test was performed and showed that this base was satisfactory. Optical elements were arranged so that requirements of beam ratio, beam angle, beam lengths, and beam intensities were met. The correct exposure time was determined by taking into consideration the reflection and transmission efficiencies of the elements together with the power output of the laser(2.2 mW) and the exposure value of the film(0.000563 mJ cm^{-2} for Kodak high speed holographic film SO-253, Estar base). A coherence test was performed to determine an acceptable limit of the difference in length of the reference and object beams. A useful formula was derived for the diameter e of the cross-section of expanded laser light on a matte surface given the diameter y of laser output, the distance q from laser to expanding lens, the distance d from lens to matte surface, and the angles ϕ_1 and ϕ_2 of laser divergence and lens divergence, respectively. It was found that $e=y+2q \tan \phi_1/2+2d \tan \phi_2/2$. If possible, holograms will be reconstructed at the presentation.

CONSTRUCTING A METEOROLOGICAL SATELLITE STATION. Doug Ferguson, 3322 Lovers Lane, Ravenna, Ohio 44266.

I am fabricating an APT station. APT is an abbreviation for Automatic Picture Transmission. An APT station receives signals from meteorological satellites and produces a photograph with this signal. There are approximately 1,000 APT stations in the world. At the time of this writing, the radio receiver for this project is completed. The radio is a McMartin tube radio that I tuned to operate at 137.5 MHZ. The Tiros-N satellite broadcasts on 137.5 MHZ. I am almost done constructing the helical antenna. The antenna will follow the satellite with the use of two antenna rotors across the sky. The amplitude modulating current from the radio will be taped and modulate an electronic tube scanning a piece of photographic paper. Construction of this facsimile is in its infancy. The photographic paper is then developed. The reason why the signal will be taped is to form a library of satellite photographs in addition of being a safety factor in case something malfunctions. After finishing construction on the receiving station, forecasts will be made using cloud patterns. More importantly, I hope this project will intrigue neighboring schools to construct one also. With an APT system, students could explore deeper into many fields of individual interest. Some of these fields would be plotting satellite orbits (math), electronics, meteorology, satellite technology, and photography. Students would be exposed firsthand to this field in a uniquely fascinating approach.

GRAM-NEGATIVE BACTERIA 1. COMPARISON OF THE API 20E AND ENTERO SET I METHODS OF BACTERIAL IDENTIFICATION 2. ANTIBIOTIC SENSITIVITY TESTS
Audrey Gonos, 392 Annis Road, South Amherst, Ohio 44001

The purpose of my experiment was to determine which of two different bacteria identification methods, API 20 E marketed by Analytab or Entero Set I manufactured by Fischer Scientific Company, should be used for bacteria identification at Elyria Memorial Hospital, Elyria, Ohio.

My experiment involved testing 20 different species of bacteria commonly identified in hospital laboratories. Both methods of identification consist of dehydrated medias which react with bacterial suspensions to show color changes which then lead one to the identification of the bacteria.

The API 20 E method involves a greater number of tests, more observations and length to perform, than the Enter Set I. I was able to identify each of the 20 different species using the API 20E method, whereas, only 12 species were identified using Entero Set I. Based on my findings, the Elyria Memorial Hospital is now using the API 20E method of identification.

The second part of my research involved testing each of the forementioned bacteria to determine which antibiotics would be most effective in inhibiting the growth of the bacteria. This type of testing is referred to as Antibiotic Sensitivity Tests. As a result of my experimentation, I was able to determine which antibiotics were most effective in killing each specific bacteria.

THE USE OF TISSUE CULTURE IN TESTING THE TOXICITY OF SOME OVER-THE-COUNTER DRUGS
Joel Gorski 106 Secor Woods Lane Perrysburg, Ohio 43551

In this study, the use of tissue culture has been explored as a means of testing the relative toxicity of nine common over-the-counter drug preparations. Measured amounts of each, 0.1 ml of the stock solution or a concentrated slurry of tablets in 0.9% saline, were applied to filter paper discs. These discs were placed in a flask on an agar surface overlaying a monolayer of mouse lung cells (L929 established cell line). Cells were allowed to incubate with the discs in place for 72 hours at 37°C. The flasks were examined at 24 hour intervals for signs of cytotoxicity as indicated by a clear zone underlaying and surrounding the discs. Living cells took up a vital dye added to the culture medium; dead cells excluded it. The degree of toxicity observed was scored 0 to 4+, from non-toxic to severely toxic, based upon the diameter of the clear zone surrounding the disc. The toxicity of the nine drug preparations was as follows: Allerest had no toxic effect at the highest concentration tested; Aspirin (A&P), Bufferin and Tylenol had a 1+ toxic effect; Robitussin and Vick's CF 44, two cough medicines, both had a 2+ toxic effect; Vick's Sinex, Sinu-tab and Privine had a 4+ toxic effect in stock solutions. In a 1:10 dilution, Vick's Sinex and Sinu-tab remained at a 4+ toxicity while Privine had a 2+ toxic effect. Further 1:100 dilutions of Vick's Sinex and Sinu-tab were non-toxic. Tissue culture appears to be a useful tool for screening drug preparations for toxicity. The high toxicity values for Vick's Sinex and Sinu-tab would indicate further studies should be made in regard to their toxic effects in man.

JUNIOR ACADEMY

A FORTY YEAR COMPARISON OF A BEECH-MAPLE COMMUNITY IN NORTHEASTERN OHIO
Kristen S. Hansen, Western Reserve Academy, Hudson, Ohio 44236

Ecological studies at two points in time are of special interest to the student of community structure. In 1936, Arthur B. Williams published *The Composition and Dynamics of a Beech Maple Community,* a study of a sixty five acre tract located in the North Chagrin Reservation of The Cleveland Metropolitan Park District. Included in his study was a detailed analysis of a belt transect traversing beech-hemlock and beech-maple associations. In 1976, and again in 1978, an attempt was made to sample and compare the same area, to determine what, if any, of the changes predicted by Williams had occurred. Standard measures of relative frequency, density and dominance were derived, and, where possible, were also compared to Williams' hypotheses that: 1. Hemlocks are being displaced by the beech and the sugar maple. 2. Beech-hemlock-oak-chestnut mictium present just prior to Williams' study is giving way to a beech-maple community.

COMPUTERIZED TOMOGRAPHY: RECONSTRUCTION OF IMAGES FROM A MULTIPLE PINHOLE APERTURE
Michael Hindi
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Oregon, Ohio 43616

Recently, a method for obtaining images of diseased body organs has been developed for aiding doctors with diagnoses of these organs. This new and relatively unknown science is tomography.

In this scientific technique, the subject organ consumes substituted radioactive nutrients so that it may radiate gamma rays for a gamma camera to image it. To shorten the long exposures necessary for this imaging, a number of holes may be placed in the camera's shutter in addition to the original single hole. This is specifically called coded aperture tomography.

Since this process leaves many overlapping images on the gamma camera's detector, the final image must be reconstructed from these images. Much image noise is created by this process, and this paper primarily deals with noise reduction. Subtraction of the autocorrelation function, combined with thresholding proved to be most effective in reducing the noise.

SYNTHESIS OF RIBONUCLEIC ACID AND PROTEIN IN PROCARYOTIC AND EUCARYOTIC CELLS
Rachel M. Jarvis 3866 St. Rt. 14 Rootstown, Ohio 44272

Three types of cellular ribonucleic acid (RNA) direct genetic processes within a cell. Ribosomal RNA is involved in ribosome structure, transfer RNA carries amino acids to a ribosome and messenger RNA acts as an intermediate between the cells genetic information and its expression into protein. mRNA is considered the basic functional unit of the genetic system so all experimentation will be centered around it in the presence of inhibitor drugs actinomycin D and puromycin which specifically bind to DNA inhibiting DNA-dependent RNA synthesis. Regulatory mechanisms allow cells to "turn genes on and off", thereby regulating the synthesis of a given mRNA and ultimately proteins. A certain mRNA is required for the synthesis of a protein, but the utilization of the mRNA is itself subject to a variety of physiological constraints, e,g. mRNA can be synthesized during one stage of development and utilized much later. The amount of protein made by a single message also varies. Messages may be able to participate one or one-hundred times in polypeptide synthesis. Preventing further synthesis of messages does not necessarily assure the rapid termination of the corresponding protein. The biological life of mRNA is of prime importance in cell regulation for if a mRNA is long-lived, the synthesis of it may be stopped but the corresponding protein formation will terminate gradually. If the message is short-lived, the repression of synthesis has a rapid effect on protein synthesis. By the use of radioactive isotopes and inhibitors the average lives of mRNA in a procaryote and eucaryote are compared and related to the effect of drugs on translation, transcription, or both in mRNA.

COMPUTER PROGRAMMING AN ABSORPTION REFRIGERATION UNIT

Gregory P. Jones
5154 Valley Forge Drive
Toledo, Ohio 43613

Behind any major engineering task is a computer simulation. Analytical and mathematical modeling is the basis for such an operation; structuring the computer hardware to design the specific simulation, assists in determining how the design will react in the optimum case and in every other instance.

The purpose of this paper is initially to describe the flow of a simple lithium-bromide and water system: water vapor (under low pressure in the evaporator) is absorbed by lithium-bromide to cool the evaporator chamber. The technical part of the paper deals with programming data from graphs and equations to computerize a simple absorption refrigeration unit which calculates temperature, pressure, concentration, and enthalpy values for different points in the system. The program would eventually enable original values to be used in the system, for the calculation of the unit's efficiency to obtain a system more advantageous to the engineer. The projection of such a table of values for the optimum operating conditions, would be useful in bringing out the main objectives of the refrigeration system: the design of a simple unit, operating at relatively low cost and full efficiency.

DEVELOPMENTAL CRYOSURGICAL INSTRUMENTATION FOR USE IN HYPOPHYSECTOMIZING MONGOLIAN GERBILS Dale Leeds 858 Cherry Lane, Waterville, Ohio 43566

In this project, the purpose was to develop an instrument capable of hypophysectomizing (removing the pituitary of) a gerbil in order to study how different pituitary hormones effect characteristics such as marking behavior and aggressiveness. In doing this, it is very important not to damage the surrounding brain tissues and after considering different methods I decided to use cryosurgery.

After developing several different methods, I took the best of each and arrived at an apparatus that utilized the following: liquid nitrogen, air pressure, a re-cooling station, and a needle that is similar to the Joule-Thompson effect, that is an open needle with liquid nitrogen coming out, is inserted into a closed needle. This causes the needle, especially the end, to freeze.

Although this apparatus works and has been used on non-living animals, it has not as yet been used on living animals. This is because the apparatus must "prove itself" before it can be used. The operation that will utilize the apparatus is as follows: Step One, put the animal under. Step Two, start the apparatus. Step Three, place the animal on the steriotaxic instrument. Step Four, place a needle through a hole in the earbar of the steriotaxic instrument to the point where it is just touching the pituitary. Step Five, place the apparatus needle through the earbar needle to the pituitary. Step Six, leave it there for a few seconds and gently pull the needle, now frozen to the pituitary, out. After this, the animal is left to recover.

THE DEVELOPMENTAL RELATIONSHIP BETWEEN FORMAL AND DOGMATIC REASONING

Joyce Luhrs
5849 Moline Martin
Walbridge, Ohio 43465

Graduate students and students in grades 7-12 (479 total students) were administered Rokeach's Dogmatism Scale and Gray's How Is Your Logic Scale. With fewer than 50% of the general population reasoning at a formal level and with the interrelatedness between characteristics of formal reasoning and open-mindedness (opposite of dogmatism) it was hypothesized that the two measures (formal reasoning and dogmatism) would be correlated and also perhaps that a change in these measures are interdependent upon one another. An analysis of variance substantiated the predicted improvement in formal reasoning and also the decline in dogmatism across the grade levels. The significant correlation between dogmatism and formal reasoning does indicate that the two are related while the absence of a significant relationship between these two measures for a majority of the individual grade levels suggests that a change in one may be a necessary condition for a later change in the other. Further research and analysis is needed to help answer the compelling question of which change precedes the other.

JUNIOR ACADEMY

RELATIONSHIP BETWEEN LOCUS OF CONTROL AND ALCOHOL AND DRUG-RELATED BEHAVIORS IN TEENAGERS.

Joyce Luhrs
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Seventh, ninth, tenth, and twelfth graders, classified as internal or external according to Rotter's Locus of Control Scale, indicated whether or not and why they engaged in alcohol consumption or marijuana smoking behaviors. Overall, a higher proportion of externals than internals drank, but the two groups did not generally differ in marijuana smoking behaviors, thus both findings were unsupportive of the "control by addiction" hypothesis. Developmentally different trends among internals and externals for the two types of behaviors suggested an interactive effect between peer culture influences and the locus of control variable. Both groups were otherwise generally similar in their reasons for engaging in the behaviors, in their desire not to stop and in their increased opinions of themselves.

DEVELOPMENT OF A HIGH PERFORMANCE SOLAR COLLECTOR USING A LIQUID LENS SYSTEM

Kelly McAleese, 47149 Bursley Road, Wellington, Ohio 44090

A high performance solar collector is developed using the unique design of a liquid lens system to focus radiant energy upon a glass tubular element insulated from ambient temperature effects by a vacuum. A simulated heat source calculated to duplicate the effect of radiant energy from the sun is designed.

In the development of the optimum collector, various candidates are evaluated. The variables examined are as follows: various tubular colors, differing tubular diameter sizes, potential construction materials (glass, copper, steel), and amounts of tubular lining. In evaluations of each parameter, all other variables are held constant. Data is taken in terms of temperature versus time and plotted as temperature versus time and BTU's versus time to aid in performance evaluation of each parameter.

Various methods of insulating the collector from ambient temperature effects are tested to prevent heat loss to the surrounding environment through radiation, conduction, and convection. From comparison of test data a vacuum is the optimum insulator. Finally, the most efficient combination of variables is built into a single unit and tested using refractive lenses to focus radiant heat onto the collector and to increase the number of BTU's generated. Reflectors under the tubular collector element are also designed to further concentrate the radiant energy. The final unit is tested: an 18" long 55 mm interior diameter glass vacuum tube, filled with clear water, a bottom surface black plastic liner, and silver reflector, performs most efficiently with lenses overhead and generates the greatest thermal output.

THE EFFECT OF HEATING TIMES ON ZINC SULFIDE PHOSPHORS COACTIVATED BY MANGANESE II CHLORIDE AND SODIUM CHLORIDE

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Toledo, Ohio 43615

The purpose of this project is to examine the effect of heating times on the peak, half-life, amplitude, and efficiency of the zinc sulfide phosphor that has been coactivated by manganese II chloride and sodium chloride. The heating times varied: 5, 10, 15, 20, 30, 40, 50, 60, 90, and 120 minutes.

The peak is the wavelength of light where the phosphor emits the greatest intensity of light. For this phosphor, it was approximately 580 nanometers. The half-life is the time required for the phosphor to lose half of its brightness. The amplitude is the height of a curve that is graphed by the intensity of light vs. the logarithm (base 10) of the wavelength. The efficiency is the area under this curve in comparison with quinine sulfate, an industrial standard.

This project then will examine the various samples and attempt to predict which sample is the most useful for industrial use in terms of half-life, amplitude and efficiency.

THE SEPARATION OF OPTICAL BRIGHTENERS BY THIN LAYER CHROMATOGRAPHY

Jeffrey T. Remillard 2251 Grantwood Dr. Toledo, Ohio 43613

Optical Brighteners are components in detergents which increase the whiteness of fabrics laundered in the detergent. The brighteners in Tide detergent and Borox 2 bleach were separated by thin layer chromatography on an adsorbent of silica gel. The separation solvent was a mixture of pyridine, water, ammonia, hexanol, and ethanol in a ratio of 5:5:5:5:3. Other solvent systems were tried, but the above mentioned solvent system proved to be superior to these.

Samples of optical brighteners obtained from the Verrona Chemical Company and the Ciba-Geigy Company were also separated by the solvent system and adsorbent described above. The R_f values obtained from the separation of these standards were compared with the R_f values obtained by the separation of detergents. (Tide and Borox 2)

Three optical brighteners were separated from the Tide detergent. However, one separation revealed 5 optical brighteners. Five optical brighteners were separated from Borox 2 bleach.

Comparison of the R_f values obtained from the optical brighteners separated from the detergents with the R_f values obtained from the separation of the standards proved difficult because the optical brighteners obtained from the chemical companies proved to be impure. Another factor which prevented the accurate comparison between the R_f values was the varience in the R_f values of the Borox 2 bleach.

PROTOZOAN LYSIS OF THE PHORMIDIUM LURIDUM

R. Dean Riddlebarger, 6134 Holliday Drive, Toledo, Ohio 43611

Cells of the blue-green alga Phormidium luridum were exposed to three different types of protozoa, morphologically distinguished by size, amoeboid structure, and flagellate arrangement. These were isolated from a Route 163 ditch sample near Oak Harbor, Ohio. After 10 days, all three species were observed to have caused a 100% decrease in algal numbers, coupled with a distinct lowering of optical density in the test solutions. At the same time, a solution of control P. luridum was shown to have continued growth in an expected manner. The overall lytic process was observed by phase-contrast microscopy, scanning electron microscopy, and transmission electron microscopy, revealing two distinct types of algal destruction. The amoeba was observed to have caused lysis by actual engulfment and ingestion of P. luridum filaments while both the small and flagellated protozoa seemed to indirectly cause lysis by means of extracellular secretions.

HERMIT CRABS - MEMORY AND INFORMATION TRANSMISSION

Faith A. Tumeo, 9100 Nichols Lane, Johnstown, Ohio 43031

I conducted an experiment to determine if Hermit Crabs, after being conditioned to a maze, can remember the correct path which should be taken through that maze. In addition, I tested to see if Hermit Crabs, through socialization, could be taught to run a maze.

The crabs were introduced to a maze, 40cm under a high intensity light. Crabs are nocturnal and therefore sought shade at the end of the maze. After 17 weeks of daily trials with effective classical conditioning, my experiment began.

The crabs were placed in the maze on consecutive Sundays for 25 weeks. If these crustations can remember, there would not be a significant difference in the standard deviation of time and errors. During the last 3 months of the remembering experiment, I aquainted group "B" crabs (which had never been introduced to the maze) to the group "A" crabs (which participated in the maze trials.)

I tested these 2 groups to see if these crustations communicated with & passed on information from one group to another. At the end of the 3 months, group "B" was introduced to the maze. If socialization had taken place, group "B"s trials would have results similar to group "A". To verify the results, a group of crabs (Group "C"), which had not been aquainted with group "A" or "B", will be introduced to the maze as a control group. If socialization has taken place, Group "C"s results should be significantly different from both group "A" & "B".

N. JUNIOR ACADEMY

SECOND MORNING SESSION
College Hall C211

N. JUNIOR ACADEMY

THIRD MORNING SESSION
College Hall C216

N. JUNIOR ACADEMY

FIRST AFTERNOON SESSION
College Hall C206

1:30 p.m. Business Meeting

O. ENGINEERING

AFTERNOON SESSION
Bareis Hall B2
RICHARD S. MAYER, Presiding

Section O will not meet in session except for a Business Meeting.
Papers will be presented in other sections.

1:30 p.m. Business Meeting

D. Medical Sciences

A REVIEW OF AN IN-HOUSE BIOMEDICAL ENGINEERING DEPARTMENT by David Bradley and Venkatasamy Veluchamy

COMPUTER-CONTROLLED TESTING USED TO DETECT ANOMALIES OF RETINAL DISPARITY IN THE HUMAN VISUAL SYSTEM by Dale Drollinger, Ronald Jones and Herman Weed

OPTIMALIZATION OF VENTILATORY CONDITIONS by C. Druzgalski, R. Donnerberg and R. Campbell

OPTIMUM TIME VARYING PRESSURE/VOLUME IN THE LEFT VENTRICLE DURING SYSTOLE PERIOD by Ricardo Sanchez and Gokhan Bilge

MAGNETIC LOCATION INSTRUMENTATION FOR REMOTE IN VIVO SENSORS by Herman R. Weed and Ram M. Engira

E. Physics & Astronomy

EXPERIMENTAL INVESTIGATION OF A LOW TEMPERATURE STIRLING ENGINE by E. William Beans

STRESS-OPTICAL COEFFICIENTS MEASURED WITH NON-CONTACT METHODS by Stamatios Kartalopoulos

G. Chemistry

HAZARDOUS MATERIAL SPILLS by Gary F. Bennett

ACCELERATED AGING OF FIVE CONTEMPORARY WATERCOLOR PAPERS by James W. Lacksonen

J. Conservation

MODULAR POROUS BREAKWATERS by S. Sarikelle and G. Mavrigian

L. Mathematics & Computer Science

DEVELOPMENT OF A B.S. DEGREE CURRICULUM IN COMPUTER SCIENCE AND ENGINEERING by James B. Farison and Donald J. Ewing, Jr.

FLOW RATE FROM PRESSURE DROP - - AN EQUATION FOR ALL REGIMES by Lawrence G. Focht

DRAG FORCE OF OBJECTS IN MUDDY WATERS by Hormoz Pazwash

MODELING HEAT TRANSFER TO IN-SITU COAL FROM SELECTED SOLVENTS by Duane R. Skidmore

P. Administrative Sciences & Planning

WASTE AND POLLUTION REDUCTION, MATERIALS AND ENERGY CONSERVATION, AND EMPLOYMENT CREATION - - THROUGH REMANUFACTURING, REFURBISHING AND REPAIRING: AN OVERLOOKED PARADIGM by Charles Overby

P. ADMINISTRATIVE SCIENCES & PLANNING

MORNING SESSION

Beeghly Library Rare Books Room

STEVE REDBURN, Presiding

PAYMENTS IN LIEU OF TAXES FOR LOW-RENT PUBLIC HOUSING AND FISCAL IMPLICATIONS FOR LOCAL GOVERNMENTS
by Yong Hyo Cho

9:30

Currently about one million low-rent public housing units are under management of local public housing authorities throughout the United States. Public housing properties are exempt from local property taxes. To support local costs for public services provided for these housing projects, payments-in-lieu taxes are made by the housing authorities to municipalities at the level of 10 percent of shelter rents of public housing. This paper reviews the historical development of this in-lieu of tax payment system and examines fiscal policy implications of this payment system in light of the fiscal difficulties faced by local governments in recent years.

TRADITIONAL PROFESSIONAL ROLES IN PLANNING AND FUTURE CHALLENGES

9:45 Edward W. Hanten, Center for Urban Studies, The University of Akron

The issue of professionalism in alternative planning models is becoming an increasing area of debate. In an era of economic decline when there is an expressed need to cut services and to scale down expectations as to what government can do, the role of the planning professional may well undergo drastic alterations which may affect his/her ability to act as a professional. Planning which has been rooted in pragmatism and which is unable to conceive of social problems in structural terms has led to the view that societal problems are complex technical questions that will respond to expert decision making and ultimately to rational social action. This view may well lead to the greatest threat, an overstepping of the boundaries of technical decision making, a pitfall the professional planner might well succumb to in his search for practical answers.

This paper is an attempt to explore the following: first, some assumptions behind the development of professionalism in the United States and the pitfalls associated with this development, and, second, assessment of the state of affairs facing planning professionals and looking at the alternative models available to them.

PUBLIC PARTICIPATION AND AGENCY ACCOUNTABILITY IN A GREAT LAKES BASIN PLANNING

10:00 PROCESS. James W. Cowden and Mimi Becker, P. O. Box 1934, Hiram, Ohio 44234.

During 1978, the Army Corps of Engineers (COE) continued planning studies on the expansion of commercial navigation capacity in the Great Lakes-St. Lawrence Seaway system. Two separate studies (the Upper Lakes and the Seaway) are being done by the Detroit District and the Buffalo District, COE, with the studies to be coordinated. Individually, both COE Districts contracted with Great Lakes Tomorrow (GLT), a non-profit, binational citizens organization, to conduct workshops in the region affected, in order to identify public concerns and issues that require examination in the planning process. The authors planned, developed and conducted the workshops for GLT to involve diverse interests throughout the Basin, obtained, organized and published the detailed public response, including recommendations for a continuing public involvement program during the rest of the planning cycle. This paper is presented as a case study of the process used to inform the "publics" of the Great Lakes Basin and to involve many in the workshop process. The modified nominal group technique used will be described and the importance of the role of a neutral, third-party in developing a credible process and encouraging agency accountability for the use the public input will be discussed. Participant evaluation of the process and a statistical analysis of that participation are presented. A critical analysis of the project as an effective mechanism for public participation in a major planning arena is given.

10:15 DEVELOPING A HUMAN SERVICES RESPONSE TO ECONOMIC CRISIS: A DECISION SEMINAR

F. Stevens Redburn, Fred C. Feitler, and Terry F. Buss, Youngstown State University, Youngstown, Ohio 44555

The Decision Seminar concept, created by Harold Lasswell, is a synthesis of methods designed to enhance group problem-solving. Its application to planning of a complex system response to crisis has been tested during the last year. In this case study report, the role of the Decision Seminar in shaping Youngstown's response to service needs created by massive job losses is assessed. Perceptions of the major actors and actual success in achieving design goals set by the group are among the measures employed.

10:30 CHANGE IN THE PUBLIC SECTOR: EXAMINING THE MYTHOLOGY

Fred C. Feitler, Youngstown State University, Youngstown, Ohio 44555

The study of organization behavior in public sector organizations has been based largely upon theory and research emanating from the private sector. Weber, Blau, Katz and Kahn and others conceptualize organization behavior from models of social systems, bureaucracy, and elements of formal organization. Such theory has been one basis of predicting and implementing change in public sector organizations. Examination of the growing literature on change and subsequent analysis of factors critical to its implementation suggest that such prediction is often inaccurate and misleading.

Some commonly perpetuated myths which effect change in public administration include the following: (1) there is a functional line and staff relationship; (2) organization behavior results from a set of formal rules; (3) supervision provides for consistency of service; (4) evaluation of performance leads to improvement. Examples from education and from other human service systems are provided.

A more plausible conceptual model is derived from individual and group socio-psychological principles. Educational and human services personnel are more like persons in voluntary organizations than they are like those in private sector bureaucracies. Motivation is more often intrinsic; decision making is shared; evaluation is voluntary. Contrasting examples of how administrators can enhance the likelihood of change utilizing principles of volunteerism are presented.

10:45 WASTE AND POLLUTION REDUCTION, MATERIALS AND ENERGY CONSERVATION AND EMPLOYMENT CREATION THROUGH--REMANUFACTURING, REFURBISHING AND REPAIRING: AN OVERLOOKED PARADIGM?

BY
Dr. Charles Overby
Industrial and Systems Engineering Dept.
Ohio University
Athens, Ohio 45701

This paper hypothesizes that in a future of resource constraints, carrying capacity limits, and rising unemployment, new paradigms may be necessary. A model different from the contemporary one for the life cycle of durable products is presented. The paper begins with a scenario of a possible new paradigm and then proceeds to explore the core elements of this model, namely remanufacturing, refurbishing, and repairing with a focus on remanufacturing. Attention is given to some of the potential benefits and impacts of a movement toward increased remanufacturing. A list of several public policy measures is given which might be considered should it be deemed desirable to attempt to enhance the movement toward remanufacturing through governmental action.

P. ADMINISTRATIVE SCIENCES & PLANNING

AFTERNOON SESSION, 1:30 P.M.
Beeghly Library Rare Books Room
STEVE REDBURN, Presiding

1:30 p.m. Business Meeting

Q. ECONOMICS

MORNING SESSION
College Hall C210
JAMES R. THOMAS, Presiding

9:00

FINANCE, TECHNOLOGY-BASED INDUSTRY, AND ECONOMIC DEVELOPMENT. Dr. David J. Brophy, 522 Business Administration, University of Michigan, Ann Arbor, MI 48109

Technology-based industry (TBI) enhances the economy of a state directly, through employment and sales, and indirectly through the incubation and "spin-off" of new, technology-based firms (NTBF). The current outlook for TBI is very good: as we enter an input-economizing mode of economic life, the domestic and international market for applied technology must expand. TBI location criteria include an agglomeration of technology-oriented universities and research facilities, a skilled work force, and reasonable accessibility to the output market. Generation of NTBF in an area depends on these factors plus conditions which encourage new business formation and the development of smaller firms. An important element is local access to finance, particularly to "venture capital" finance. While the venture capital supply system is operationally efficient, the geographical concentration of venture capital intermediaries reduces the allocation efficiency of the market. The absence of local access to the venture capital market impedes the development of the ambience necessary for NTBF generation and small firm development. Financial incentives are now used by states to encourage economic expansion. Few of these meet the needs of NTBF. In several states, development corporations modeled after the Canada Development Corporation are used to meet these needs. Because they promise to fill the "venture capital gap" these organizations will probably proliferate among the states and become a significant factor in area economic development.

Symposium: Financing Public Education in Ohio

9:15

MIXING RESEARCH AND POLITICS: THE CASE OF PUBLIC SCHOOL FINANCE Carla Edlefson, Citizens' Council for Ohio Schools, 1501 Neil Avenue, Columbus, Ohio 43201

The formulation of good policy for financing public elementary and secondary education depends on economic research, typically involving a large, computerized information system as well as some simulation models and statistical anlayses. Making state policy for funding schools involves a lot of data because the state shares the financial burden with hundreds of local school districts. Since the state's role is one of equalizing the ability of all school districts to provide adequate educational programs, education finance policy should take into consideration the property tax base, other indications of wealth, tax rates, the number of students, incidence of special educational need, etc., in all the districts. It should also have projections of these variables into future years.

Economic research on school finance and tax questions runs up against the political process in two general ways. First, the collection of information and the maintenance of data files are functions that are often located in state agencies where there is little interest in or sympathy for research. Organizational politics may result in usable data never becoming available. Second, information is power, and in the politics of the state budget it is usually to someone's advantage that there be less information, rather than more. It is possible that researchers would find no audience for the results of their analyses. This paper discusses some of these problems as they exist in Ohio and recommends some means of overcoming them--a necessary first step towards exemplary school finance and tax policies in this state.

9:30 STATE AID FOR SCHOOL FACILITIES. Dr. Charles M. Sisson, Jr.
Battelle's Center for Improved Education, 505 King Avenue, Columbus, Ohio 43201

Since World War II, constant demands for facility replacement, additional facilities, and accelerated construction costs and interest costs have continued to sustain the need for expenditures for local capital outlay programs. These costs are primarily the responsibility of the local school district and the financial burden falls on the local property tax base. However, the extent and the way that it is being used is now being strongly questioned. The property tax question becomes increasingly acute where the need for replacement, remodeling, renovation or additional educational facilities is high and the access to local property wealth is low. Poor school districts that attempt to provide educational facilities comparible to those of wealthier districts are severely handicapped under these circumstances.

If the issues of school finance are going to be considered in their entirety, the importance of financing school facilities cannot be overlooked. Although a majority of the school finance court cases in the past few years has spoken primarily to issues of operating funds for such things as salaries, supplies, heat, lights, etc., there is evidence that there are even greater disparities in tax equity and educational opportunity in providing local school districts with buildings than in other types of expenditures. The time has come in our public school finance reforms to give serious consideration to the provision of physical facilities for the educational process.

10:00 FACTORS ASSOCIATED WITH VOTER RESISTANCE TO PUBLIC EDUCATIONAL EXPENDITURES
Dr. Michael S. Broida, School of Business, Miami University, Oxford, Ohio 45056

The purpose of this paper is to explore quantitative factors which are associated with voter support of (or resistance to) public education. For the purposes of this demonstration it must be assumed that high expenditure per pupil (and the corresponding higher taxes) are more likely to be associated with better school programs than are lower expenditure per pupil. In addition, a portion of this research will establish rudimentary evidence as to the relationship between cost per pupil (by district) and school district size. This analysis will take place with a multiple regression and correlation analysis. We will use the findings as tools to suggest to decision makers what sort of financing plan for public education is feasible. However, no specific plan will be suggested.

We will find mixed evidence that income, either wages or median family income, is associated with expenditure per pupil. There is some evidence that larger districts are associated with lower cost per pupil. Some cost factors, such as percent ADC, are associated with higher expenditure per pupil. Other findings can be inferred from the complete study.

10:15 AN ALTERNATIVE METHOD FOR FINANCING PRIMARY AND SECONDARY EDUCATION IN OHIO.
Richard T. Taliaferro, 1620 Diplomat Drive, Dayton OH 45432.

Growing resistance of voters to increases in the property tax for financing rising costs of primary and secondary education in Ohio has resulted in the closing of schools from time to time for lack of money. Rising teacher militancy in wage negotiations with school boards has exacerbated the problem.

An alternative means of financing school costs to preclude further school closings as discussed in the paper involves replacing the property tax as the principal vehicle for raising school funds. In its stead, general state revenues supplemented by existing federal money would be apportioned on a formula basis to each school district. To carry out the new financing responsibilities, a new Primary and Secondary Education Authority would be created within the State Department of Education. The Authority would consolidate operating and maintenance costs in a statewide budget subject to further action by the Governor and State Legislature. The authority would also have the authority to issue bonds for capital improvements subject to approval by the Governor and the Legislature. Such bonds would become general obligations of the state of Ohio.

As part of the change in financing methods, the Authority would approve all teacher salary negotiations. Any disputes would be subject to mandatory arbitration by a permanent commission set up expressly for that purpose.

Q. ECONOMICS

AFTERNOON SESSION, 1:30 P.M.
College Hall C210
JAMES R. THOMAS, Presiding

1:30 p.m. Business Meeting

R. ECOLOGY

FIRST MORNING SESSION
Bareis Hall B102
DAVID WALLER, Presiding

9:00 THE DISTRIBUTION OF DIATOMS IN A NORTHWESTERN OHIO BOG LAKE.

Mary G. Bruno Department of Biological Sciences Bowling Green State University Bowling Green, Ohio 43402

Differences in the distribution of diatoms inhabiting the floating mat at Mud Lake Bog, Williams County, Ohio were examined with the aid of cluster analysis. Mat samples were collected on a bimonthly basis from June to November, 1977 at the three selected study sites. Thirty-six of the 56 diatom species identified from these samples were used in subsequent data analysis. The results of the clustering program clearly indicate that the distribution of diatoms on the Mud Lake mat is site-related. Four distinct assemblages, or clusters, of diatom species were evident: the Carex, Scirpus, Sphagnum-Larix and Carex/Sphagnum-Larix assemblages. Correlation and regression analyses were employed in an attempt to relate these differences in distribution to certain physical and chemical parameters, such as temperature, rainfall, and levels of PO_4, NO_2, NO_3, pH and calcium. On the basis of these analyses the differences in diatom community composition from site to site on the Mud Lake mat is attributed primarily to variations in the levels of pH and calcium among the three distinct sampling sites.

9:15 PRIMARY PRODUCTIVITY OF SUMMIT LAKE, SUMMIT COUNTY, OHIO

Jeff DeShon
Dept. of Biology
University of Akron
Akron, Ohio 44325

Summit Lake, located within the city limits of Akron in NE Ohio, is an unusual lake that sits astride a major continental divide. Its complex interchange of water with the Ohio Canal and other area lakes along with its urban setting and heavy industrial use adds to the interest generated by its unique geographical location. Phytoplankton composition, biomass, and productivity were studied at approximately weekly intervals from June to September, 1977. Blue-green algae, especially species Anacystis and Oscillatoria, and the diatoms, Fragilaria crotonensis and Cyclotella Meneghiniana, usually accounted for most of the phytoplankton. Average biomass for the period was 27.5 mm^3/liter. Photosynthetic rates for the 12 weekly measurements averaged 2100 $mgCm^{-2}day^{-1}$.

9:30 ECOLOGICAL NOTES ON A CONCHOSTRACAN (CRUSTACEA) INHABITING WOODLAND PUDDLES IN ZALESKI STATE FOREST, OHIO. Kenneth Emberton, Jr. Dept. Zoology and Microbiology, Ohio University, Athens, 45701.

In a series of four observations in fall, 1978, conchostracans, believed to be a single new species of the genus Cyzicus, were found in only three puddles of a group of about 20 along a logging road in deciduous woods at Zaleski State Forest, Ohio. One puddle was sampled three times at three-week intervals; maximum density of conchostracans was estimated as 32 per m^2 in the roughly circular puddle of $3.1m^2$. Dispersion was significantly aggregated (nearest neighbor method, $p<<.0001$). Density was greatest in the deepest part of the puddle away from overhanging grass. No significant correlation was found between conchostracan density and water depth or between density and an index for mud depth (Kendall's tau test). Of a total of 92 animals examined throughout the study, all were females. In a collection of 25, taken 10/7/78, smaller females were ovigerous significantly more often than larger females (runs test, $p<.05$). Mean shell length of the population increased in three weeks (9/15-10/7) from 11.16 to 11.25mm and in another three weeks (10/7-10/28) to 11.40mm.Growth rate was slower than other examples in the literature, probably due to already mature size and to egg production. In the last collection, shortly after the first frost of the season, the conchostracan population was reduced by about two-thirds. Attempts to culture the conchostracans in the lab, using mud and water taken from the study puddle, were unsuccessful.

9:45 THE EFFECTS OF SEWAGE SLUDGE AND FERTILIZER ON AN AGRICULTURAL AND A GRASSLAND ECOSYSTEM. Warren G. Taylor, Institute of Environmental Sciences, Miami University, Oxford, Ohio 45056.

The effects of sewage sludge and fertilizer on primary production in an agricultural and a grassland ecosystem were evaluated using .1 ha plots. Sewage sludge was applied at a rate of 1814 kg/ha to three replicate plots in both a wheat field and a perennial pasture located at Miami University. Also in each field fertilizer (6-2-0) was applied at a rate of 318 kg/ha to three replicate plots. Two untreated control plots were established in each ecosystem. Applications of sludge and fertilizer were made once monthly May-September, 1978. Biomass was measured eight times from April-October and above ground net primary production was estimated. Live biomass in the fertilizer and sludge plots was significantly greater than the control after June in the grass field and after July in the agricultural field. Live biomass in the fertilizer plots was significantly greater than the control during June and July in the grass field and from June to August in the agricultural field. Net primary production ($g/m^2/yr$) in the agricultural field was 1690 with the fertilizer treatment, 1240 with the sludge treatment, and 672 with the control. Net primary production ($g/m^2/yr$) in the grass field was 1110 with the fertilizer treatment, 684 with the sludge treatment, and 424 with the control. No significant difference was found in seed production by the wheat due to treatment.

10:00 REPORT OF UNUSUAL MACROINVERTEBRATE SPECIES FROM THE OHIO RIVER David C. Beckett; Dept. of Biological Sciences, Univ. of Cincinnati, Cincinnati, Ohio 45221

Aquatic biologists have long been aware that increases in stream order are concomitantly reflected in an increase in the number of species present. With an increase in the possible number of species present the probability of finding rare or unusual species in a habitat also increases. The Ohio River, at the pinnacle of stream order in the east-central United States, supports such a diverse macroinvertebrate fauna with a number of unusual species.

Macroinvertebrate collections in the Ohio River in June 1976 included two unusual Ephemeropterans (mayflies). A rare predaceous mayfly, *Anepeorus* sp., was collected along with an undescribed *Heptagenia* sp. which had previously been reported from only a few scattered locations in the southeastern United States. An unusual chironomid (order Diptera) described as Orthocladiinae gen? 1. *acutilabis* was collected in January 1978. In the United States this species had previously been found only in rapid streams in the upper peninsula of Michigan and in mountain streams in Georgia.

A remarkable shift in Ohio R. amphipods (Crustacea) has taken place in very recent times. *Crangonyx* sp., the dominant amphipod species in the Ohio River in the early 1960s, has been completely replaced by a *Gammarus* sp. unknown to the Ohio prior to 1967. Also of interest are the recent collections of the freshwater jellyfish *Craspedacusta sowerbii* from the Ohio River.

10:15 FEEDING INTERRELATIONSHIPS BETWEEN THE SAND SHINER, NOTROPIS STRAMINEUS, AND THE STRIPED SHINER, N. CHRYSOCEPHALUS. Alan L. Gillen, Department of Zoology, Ohio State University, Columbus, Ohio 43210.

Feeding habits of Notropis stramineus and N. chrysocephalus were investigated in Buffalo Creek, Washington County, Pennsylvania during September through December, 1977. As an opportunistic feeder, N. stramineus consumed large quantities of terrestrial (∿40%) and aquatic (∿50%) insects during September and October, but shifted almost entirely to benthic insects (∿90%), such as mayfly nymphs (Caenis and Stenonema) and stonefly nymphs (Alloperla and Isoperla), in November and December. N. stramineus utilized a wide range of prey with the bulk of its diet in the size class 5-8mm. N. chrysocephalus was also an opportunistic feeder, taking terrestrial and aquatic insects during fall. N. chrysocephalus consumed large aquatic prey (9-12mm) including crayfish (Orconectes), large mayfly nymphs (Stenonema), and damselfly naiads (Argia) from September through November. However, in December its diet shifted to Cladophora and a few aquatic Chironomidae larvae.

Although diet overlap was nearly complete initially (September and October), it diminished as the season progressed. Food habits were unique to each species late in the year, suggesting that as food resources decline these two species appear to diverge in their food habits to minimize interspecific competition.

10:30 Business Meeting in Bareis Hall B102

R. ECOLOGY

SECOND MORNING SESSION

Bareis Hall B202

G. D. COOKE, Presiding

9:00 WATER QUALITY AND FISH COMMUNITIES IN THE OTTAWA RIVER: THE EFFECTS OF WASTEWATER DISCHARGES FROM THE CITY OF LIMA. Thomas J. Balduf and Gary L. Martin, Ohio Environmental Protection Agency, Bowling Green, Ohio 43402.

Chemical-physical measurements and fish community composition were criteria used to evaluate the water quality of the Ottawa River. By 1960, inadequately treated municipal and industrial wastewaters entering the Ottawa River at Lima, Ohio, had eliminated fish populations from a 40 mile segment of the Ottawa-Auglaize River system. In 1977, the fish community upstream from Lima was healthy and diverse, consisting of mixed-populations of suckers (Catostomidae), minnows (Cyprinidae), darters (Percidae), and sunfishes (Centrarchidae). However, downstream communities showed significant reductions in the number of species collected. Although fishes had re-populated approximately 32 miles of the 40 mile segment by 1977, the fish community was still stressed for at least 30 miles below Lima. The occurrence of three species of darters (Etheostoma blennioides, Percina caprodes and P. maculata) in the lower Ottawa River during 1977 shows that water quality is improving. Low dissolved oxygen levels, high ammonia and chromium concentrations, along with sludge deposition were the most severe water quality problems found. Improved municipal and industrial wastewater treatment has reduced the pollution load to the river considerably; however, high ammonia levels downstream from two industrial dischargers remain an important water quality problem.

9:15 FLAWS IN WATER POLLUTION CONTROL REVEALED IN A RECENT CASE IN WOOD COUNTY. Karl Schurr, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Scientists normally expect a straightforward response to instances of gross violation of water quality standards and violation of those laws relating to stream quality and stream integrity. Evidence of the environmental insult is given and the excellent nature of the work, by field specialists in the Ohio Department of Natural Resources, Ohio Environmental Protection Agency, Army Corps of Engineers and the United States Fish and Wildlife Service, is described. Nevertheless, the polluting and destructive activity continued. The behavior of various officials is evaluated. Several parameters showing stream damage are, beyond question, ruinous to this stream. These events are pertinent to those interested in the ecology of the region.

9:30 THE EFFECT OF THE GREENWICH SEWAGE LAGOON DISCHARGE UPON TWO SMALL RECEIVING STREAMS IN NORTHWEST OHIO. Gary L. Martin, Ohio Environmental Protection Agency, 1035 Devlac Grove Dr., Bowling Green, Ohio 43402

Benthic macroinvertebrate and fish population changes, along with chemical-physical measurements, were criteria used to determine the effect of a sewage lagoon discharge upon the water quality of the Southwest Branch of the Vermilion River and a small intermittent stream receiving the wastewater. Macroinvertebrates and fishes were sampled quantitatively during the summer and autumn and qualitatively during the spring. The intermittent stream generally was within limits established by Ohio's water quality standards and the occurrence of pollution sensitive fish (Cottus bairdi, Etheostoma caeruleum and E. nigrum) showed that the water quality was often good. However, the macroinvertebrate community was dominated by facultative and pollution tolerant taxa indicating that occasionally water quality was poor in the intermittent stream. The lagoon discharge lowered dissolved oxygen and increased nitrogen, phosphorus, and chloride concentrations in the Southwest Branch. However, water quality standards were maintained, the designated uses of the stream were not impaired, and the biological community remained healthy and diverse. The abundance of clean water taxa and high diversity (d) values found downstream showed that the lagoon discharge did not damage the macroinvertebrate community. A well-balanced fish community, including five species of darters (Percidae) and the Mottled sculpin (Cottus bairdi) indicated good water quality in the Southwest Branch.

9:45 EFFECTS OF AN OVERWINTER DRAWDOWN ON MACROPHYTE DISTRIBUTION, ABUNDANCE, AND COMPOSITION IN A PERMANENT RECREATIONAL POND. Mark E. Gorman. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

A 49.5% (by area) water level drawdown was performed on a 2.47 ha recreational pond from November, 1977 through March, 1978 to test that technique for macrophyte control. Pond-wide macrophyte distribution, abundance, and productivity were measured before and after the drawdown. Summer mean depth for the pond was 1.38 m in 1978 compared to 1.81 m in 1977 due to incomplete refilling in spring, 1978. More light reached a greater pond bottom area in 1978, resulting in a greater area coverage by macrophytes (15839 m^2 maximum) than in 1977 (13385 m^2 maximum). Summertime areal coverage increased for Najas flexilis and Potamogeton pusillus by factors of 2.68 and 11.94, but did not significantly change for P. gramineus, P. foliosis, P. pectinatus, P. crispus or Elodea canadensis. Chara globularis was present in 1977 and Ceratophyllum demersum in 1978, but neither was observed in the alternate year. Peak biomass (dry weight/m^2) along a transect dominated by Najas was 1.46 times higher in 1978, whereas macrophyte productivity (mg dry wt/m^2/day) was comparable during the two years in an area where Najas and P. gramineus were roughly co-dominant.

10:00 EFFECTIVENESS OF A POLYPROPYLENE SHEETING IN CONTROLLING MACROPHYTE RE-GROWTH IN COUNTRY LAKE (PORTAGE CO., OHIO). G. Dennis Cooke and Mark E. Gorman. Department of Biological Sciences, Kent State University, Kent, O. 44242

Excessive production of macrophytes ("weeds") in ponds and lakes represent a significant nuisance to recreational and other water-related activities. This project was designed to test the effectiveness of black spun-bonded polypropylene Dupont Typar sheeting in controlling the re-growth of macrophytes, when the sheeting is applied to exposed pond sediments which had been consolidated and frozen during pond drawdown. Following application in March, 1978, biomass samples from the experimental area were compared to samples from a nearby transect during summer, 1978. Dupont Typar stopped the re-growth of macrophytes; only macroalgae and some Najas flexilis grew on the sheeting. Biomass in the control area was always 100X or more that of the covered area. High permeability of the sheeting allowed gases to escape, thus preventing "ballooning", a common fault of other sheeting compounds. Cost of application for selected lake or pond areas would be modest.

10:15 CHANGES IN THE MICROCRUSTACEAN COMMUNITY OF EUTROPHIC WEST TWIN LAKE FOLLOWING LAKE RESTORATION. Mary F. Moffett, G. Dennis Cooke, and Donna N. Myers. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

The hypolimnion of West Twin Lake was treated with 100 tons of aluminum sulfate in 1975 in an effort to control internal phosphorus release, and thus lake productivity. Summer planktonic microcrustacean species diversity, expressed as Shannon's H', was significantly lower in West Twin in 1976 and 1978 after the treatment, compared to an untreated downstream reference lake (East Twin). H' did not differ between the lakes in 1969. Dominance, as measured by the Simpson index, was higher in West Twin after treatment but not in East Twin. Community similarity between the lakes, as measured by indices of Pinkham and Pearson (1976) and Whittaker and Fairbanks (1968), was lower after treatment than before. The persistence of these changes three years after treatment leads us to conclude that there has been a fundamental change in the structure of the microcrustacean plankton community of West Twin Lake, probably due to the hypolimnetic application of aluminum sulfate. Manipulation of one component of a lake ecosystem to control symptoms of eutrophication may bring about unpredicted changes in other components.

10:30 Business Meeting in Bareis Hall B102

R. ECOLOGY

FIRST AFTERNOON SESSION

Bareis Hall B102

ELLIOT TRAMER, Presiding

1:30 EFFECTS OF ROAD DUST UPON GROWTH CONDITIONS AND PHYSIOLOGY OF SPHAGNUM IN NORTHERN ALASKA. Peter D. Spatt. Dept. of Biological Sciences, Univ. of Cincinnati, Cincinnati, Ohio 45221.

Studies during two field seasons on the Alaskan north slope attempted to assess effects of road construction and road dust upon Sphagnum (SPHAGNACEAE). Data were collected from one floristically uniform site along the Alaska Pipeline haul road. Dust, arising from vehicular traffic, settled in greatest quantities near the road with the amount decreasing in a log-like manner away from the road. Relative water content of Sphagnum in quadrats close to the road was generally low as compared to Sphagnum in more distant quadrats. Total conductivity, pH, and calcium content of water extracted from Sphagnum was greatest in heavily dust impacted quadrats. Chlorophyll content (ug chlor.'a/ g dry weight) was greatest in Sphagnum little exposed to dust and lowest in plants heavily exposed. Photosynthetic rates of Sphagnum from low dusted quadrats were higher than photosynthetic rates of Sphagnum from heavily dusted quadrats, as determined by uptake of ^{14}C labeled CO_2

1:40 PRELIMINARY INVESTIGATIONS OF THE CAVES AND CAVE FAUNA OF OHIO. H.H. Hobbs III Department of Biology, Wittenberg University, Springfield, Ohio 45501.

A total of 79 caves developed in Silurian, Devonian, Mississippian, and Pennsylvanian rock from 22 counties in Ohio has been reported in the literature. Generally all are rather small (maximum length of 550 meters); caves developed in limestones and dolomites are restricted to the Silurian and Devonian stratigraphic units in the western half of the State, whereas shallow shelter "caves" are formed in the Mississippian and Pennsylvanian sandstones, shales and conglomerates of southcentral and northeastern Ohio. Very few references have been made to fauna living in these subterranean passages, yet considerable efforts have yielded remains of invertebrate (mainly Mollusca) and vertebrate (including man) organisms. A single troglobite, Caecidotea stygia Packard (Isopoda), known only from Cedar Fork Cave in Adams County has been reported from the State. Recent efforts from a continuing systematic study are yielding data concerning not only the distribution of caves, but also on the ecology and distribution of Ohio cavernicoles.

1:55 GROWTH STUDIES OF RED-TAILED HAWKS IN NORTH-CENTRAL OHIO. Mark A. Springer, Department of Anatomy, Wright State University, Dayton, Ohio, 45435.

The majority of growth studies on falconiform birds are qualitative natural histories, which because of inadequate data and/or verbal description, often make comparisons virtually impossible. In the present study body weight, and length of 7th primary, culmen, tarsus and 3rd toe were measured.

The general form of the growth curves based on body weight and the linear anatomical measurements of nine Red-tailed Hawks is sigmoid, and best described by the logistic equation. Allometric analysis of the body parts measured was characterized by negative allometry with regard to the increase in body weight. Intraspecific variation up to 22% was observed in the cumulative increase in body weight. Sexual dimorphism, another cause of intraspecific variation, was statistically significant (F, $P<.01$) in body weight and 7th primary length but was less apparent in length of tarsus and 3rd toe. Body weight was a good indicator of specific age up to the 23rd day; however, the 7th primary became significant upon emergence (9th day) and was the best indicator of specific age after the 23rd day. Body weight and the length of tarsus and culmen appeared to be good indicators of the general health of the fledglings.

2:10 A YEAR-ROUND FIELD STUDY OF WEATHER-DEPENDENT BEHAVIOR OF THE ROADRUNNER. I. WINTER. Kathleen G. Beal, Dept. Biol., Capital Univ., Columbus, OH 43209.

Recent research shows that some avian behavior is weather-dependent. This field study in a non-desert habitat examines the probability of observing various behaviors of the Roadrunner (Geococcyx californianus) under combinations of weather parameters (solar radiation, wind velocity, ambient temperature, water vapor pressure deficit) and time of day. Data collected in December indicate that weather and time of day are good predictors of behavior at that time of year. Both energetics and motivation must be considered to understand this relationship.

2:25 COLLECTIVE DISPLAYING IN AMERICAN WOODCOCKS. Wayne C. Zipperer and David W. Waller. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Neighboring male American Woodcocks (Philohela minor) were observed for breeding display interactions. The study was conducted during the spring of 1977 and 1978 at Kent State University in Kent, Ohio. Performances by neighbors of the aerial antics of the display overlapped, as in a round. Of 204 individual aerial displays, 78% were initiated within one minute of the initiation of a neighbor's display. By this criterion, there was significant dependence in timing between neighbors. Also, the variability of the interval between initiations of aerial displays of neighbors in a round was significantly low. The order in which neighbors initiated display in each round was constant for significantly extended periods of time. Further, the male occupying the most central territory was first in 59% of all rounds, a proportion significantly different from 50%. The observed coordination and leadership in display indicates that woodcocks display collectively.

ECOLOGY

2:40 POPULATION ECOLOGY OF COMMON GALLINULES IN SOUTHWESTERN LAKE ERIE MARSHES
Alan W. Brackney and Theodore A. Bookhout. Ohio Cooperative Wildlife Research Unit, 1735 Neil Avenue, Columbus, Ohio 43210.

Population size, distribution, and reproduction of the common gallinule (Gallinula chloropus) were studied in 1977-78 in the southwestern Lake Erie marshes of Ohio. Gallinules were censused in 1978 by playing a tape-recorded playback call and counting the number of responding individuals within a 40-m radius of the observer. Ten to 20 of these 0.5-ha circular plots were placed randomly in each of 16 homogeneous marsh habitats. The frequency of nonresponse was estimated from responses of pairs with known locations. Male response rates (93%) were more consistent than female response rates (21%). Therefore, densities based on calling males were used to obtain population estimates, with a correction for nonresponding individuals. Nest density estimates from strip transects on 6 marsh areas were not different ($P > 0.05$) from densities based on calling males. Pair density estimates ranged from 4.63 to 0.71 pairs per ha of vegetated habitat. The population for all southwestern Lake Erie marshes was estimated to be 1,198 $\pm$ 520 pairs. Gallinules occupied 718 ha (14%) of 5,188 ha of all marsh types. Clutch size averaged 8.04 $\pm$ 0.56 eggs per clutch for 55 nests, and nest success was 66% over both years. Twenty-eight brood counts averaged 3.6 $\pm$ 0.7 fledged young per brood.

3:00 SEX RATIO, SIZE, AND GROWTH OF AMBYSTOMID SALAMANDERS IN A DECLINING POPULATION
Nancy Seifert, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403

Ambystoma tigrinum and A. maculatum were captured, marked, measured and released during spring breeding migrations to a permanent pond in Steidtmann Wildlife Sanctuary, Wood County, Ohio, for four years, 1972-1975. The last zero-year cohort left the pond in 1971 owing to fish predation on eggs after that year. Totals captured decreased from 550 in 1972 to 360 in 1975, and the proportion of A. tigrinium declined from 66 to 47%. An analysis of the number, snout-vent length, and sex ratio of new recruits to the breeding population supported the interpretation that males of both species matured sexually one or two years earlier than females, and for A. maculatum, at a smaller size. The yearly growth rate in snout-vent length was approximately linear for males, but the annual increment for females and larger males was equal to the error of measurement, supporting a model of determinate growth in salamanders.

3:15 SELECTION AND CONSTANCY OF NEST SITE BY NESTING CHIMNEY SWIFTS.
Ralph W. Dexter, Dept. of Biological Sciences, Kent State University, Kent, Ohio 44242.

In sample of 400 nests of the Chimney Swift (Chaetura pelagica L.) measured on the campus of Kent State University, 1945-1968, it was found that the depth at which nests were placed in air shafts ranged 5.6 - 53.2 ft. from top (aver. 22). South walls (40.7%) were chosen over north walls (25.2%) and west walls (23.5%) were used more often than east walls (10.5%), but more important than compass direction was relative width of wall (71% on wall of greater width, and only 13.7% on walls of lesser width). With one or both mates continuing in the same shaft, the nest was placed on the same site 58% of total sample (348 nestings), but on basis of former residents only, same site was occupied 71.8% of time. Maximum record for occuping same site was 13 years (Shaft P3, 1947-59). New mates tend to select a new nest site.

R. ECOLOGY

SECOND AFTERNOON SESSION

Bareis Hall B202

J. H. OLIVE, Presiding

1:30 THE LIMNOLOGICAL PROCESSING OF RIVER WATER IN THE NEARSHORE ZONE OF LAKE ERIE, AND A GRAPHICAL TECHNIQUE FOR ITS ANALYSIS. R. Peter Richards, Water Quality Laboratory, Heidelberg College, Tiffin, Ohio, 44883.

Understanding the processing of river water within the nearshore zone of Lake Erie is central to the improvement of models for whole-lake responses to tributary loadings. Within the first few kilometers of its entry into the lake, river water is diluted by mixing with lake water, and the values of conservative parameters such as conductivity drop to typical open lake levels. Suspended sediments and related parameters are reduced by sedimentation as well as by dilution. Other parameters such as dissolved orthophosphorus and silica are reduced by dilution and biological uptake.

We define a processing index, $PI_i=100(x_{rm}-x_i)/(x_{rm}-x_{ol})$, where PI_i is the processing index of the i^{th} station along a transect from river mouth to open lake, x_i is the value of a parameter at station i, x_{ol} is the open lake value, and x_{rm} is the river mouth value. This processing index varies between 0 at the river mouth and 100 in the open lake. Parameters expressed in this fashion can be visually compared by plotting them on the same set of axes. Parameters affected by the same set of processes should have identical processing index curves, within the limit of experimental error. Parameters which are subject to different modes of processing should have curves that rise from 0 to 100 at different rates. Detailed comparison of curves for different parameters along the same transect may allow assessment of the relative importance of dilution, biological uptake, and sedimentation for a given parameter.

1:50 THE VALUE AND USE OF FISH AS INDICATORS OF WATER QUALITY. Chris Yoder, Ohio Environmental Protection Agency, 361 E. Broad Str., Columbus, OH 43215.

Biological monitoring is gaining importance in the assessment of water quality in the surface waters of the United States. Time, manpower, and resource constraints usually limit pollution control agencies to consider one or two aquatic organism groups. The suitability of fish as indicators of water quality conditions is discussed. Some results of previous studies in several Ohio rivers and streams are used to illustrate methodologies for the collection, analysis, and use of fish community and population data. The composite index of community well-being (I_{WB}) was used to show changes in community abundance and diversity while community composition based on relative density and biomass was used to show changes in species populations. Information derived from these and similarly conducted studies can be used to evaluate waste load allocation modeling studies and areawide water quality management programs. Probably the most important result of these efforts is the determination of where the Clean Water Act interim goal of fishable waters is or is not being achieved.

2:10 PURSUING THE IMPOSSIBLE DREAM: A UNIFIED WATER QUALITY INDEX. Robert E. Carlson and Sherilyn C. Fritz. Department of Biological Sciences, Kent State University, Kent, Ohio. 44242.

The variables used to describe water quality can be grouped into those which describe the nature and amount of contaminants, those which consider the effect of the contaminants on the receiving body of water and those which are related to human health or aesthetics. There have been several attempts to combine variables from all three groups into unified indices which will reflect all aspects of water quality. Each of the above groups has certain unique characteristics and problems that severely limit the construction of a useful unified index. A comparison of indices using data gathered on the Cuyahoga River will be used to illustrate the problems of index construction.

2:25 EUTROPHICATION STUDIES OF A SMALL IMPOUNDMENT IN CENTRAL OHIO. R. K. Markarian, M. A. Eischen, and L. T. Connor. Battelle's Columbus Laboratories; Ecology and Ecosystems Analysis Section; 505 King Avenue; Columbus, Ohio 43201.

A small (25 acre) impounded lake is being studied in order to describe the levels of eutrophication and the effects of farmland runoff. Studies began in September of 1977 when the lake was under the influence of two aerators. Dense populations of Aphanizomenon (500-1000 mg/ℓ) were present at the time. In an effort to reduce the growth of the algae, the aerators were turned off in October. Monthly monitoring for phytoplankton, nitrates and phosphates has been ongoing since October of 1977. Excessive algal growth did not occur in the lake during the spring, summer and fall of 1978. The "mats" of Aphanizomenon sp. did not develop in 1978. Species diversity has increased from two to three dominant species of algae in 1977 to five to ten common species in the fall of 1978.

Dominant species found in 1977 samples were Aphanizomenon sp. and Microcystis sp.; these species were present in large numbers at depths of 15 feet. In the spring of 1978 the species composition has shifted; diatoms Synedra sp., Asterionella formosa and Melosira sp. were prevalent. In August, species of the order Chlorococcales, particularly Volvox sp., were dominant in collections. During the fall of 1978, Microcystis sp. was the dominant species in surface samples. The bloom was not distributed throughout the water column and was not of the same order of magnitude as the Aphanizomenon bloom of 1977. In general, the algal community found in the lake during 1978 was well diversified among greens, blue-greens, and diatoms.

2:40 PROSPECTS FOR REDUCTIONS IN AGRICULTURAL PHOSPHORUS LOADING TO LAKE ERIE David B. Baker, Water Quality Lab, Heidelberg College, Tiffin, Ohio 44883

Point and nonpoint sources account for approximately equal proportions of the phosphorus loading to Lake Erie in the 1970's. Most of the nonpoint source loading of phosphorus accompanies the intensive, row-crop agriculture of Northwestern Ohio. In developing integrated point-nonpoint source management strategies for achieving phosphorus load reduction goals, accurate estimates of the potential costs and effectiveness of agricultural pollution abatement measures are necessary.

As part of the Lake Erie Wastewater Management Study, the Army Corps of Engineers has developed a detailed cellular data base for the Lake Erie Basin. These data allow both the calculation and mapping of gross erosion rates for individual river basins and an aggregation of the erosion data according to suitability classes for remedial measures. Preliminary analysis of the data indicates that a large proportion of the gross erosion occurs in areas where: 1. soils are suitable for conservation tillage practices while maintaining and/or improving farm yields and profits; 2. eroded soils have a high delivery to streams; and 3. existing erosion rates exceed soil-loss tolerance limits and consequently should be of concern to individual farmers. The co-occurrence of the above factors suggests that major reductions in agricultural phosphorus loadings to Lake Erie may be feasible at relatively low costs.

POSTER SESSIONS
CAMPUS CENTER, GREAT HALL

9:00 FACTS YOU SHOULD KNOW ABOUT EPILEPSY INCLUDING A BRIEF STUDY OF SODIUM VALPROATE (Valproic Acid-Depakene)

Mary E. Springer, 330 Lockville Road, Pickerington, Ohio 43147.

This paper deals with epilepsy from its ancient history to current anticonvulsants which are being used to control the person with this condition.

Epilepsy, which is considered the oldest condition of the brain, was known as far back as the ancient Egyptians and Hebrews. They believed that a person with a seizure was being seized by a demon who took possession of him, causing him to writhe and salivate at the mouth, but the Hebrews treasured the mutterings as inspired prophecy.

The first major step towards controlling seizures was in 1861 when English physicians found Potassium Bromide (Kbr) helped reduce the number of seizures one had.

The three main types of seizures diagnosed are Petit Mal, Grand Mal, and Psycho-Motor.

Employment is a tremendous problem for the person with epilepsy. Unemployment and under-employment cost the nation 1.45 billion dollars in 1975. Because rejection is so great to the person with epilepsy, many appear to be insecure and defensive.

The seizure prone person's road to improvement starts in the home, because the family needs to make that person feel self-assured and confident in himself.

Sodium Valproate-Depakene is the latest anticonvulsant approved by the F.D.A. Tuesday, February 28, 1978. It will mainly be used to control mixed seizure types. One study performed on this drug concluded a 61% improvement and only a 15% decline in condition.

9:00 EFFECT OF DIETHYLSTILBESTROL ON THE MOUSE PLACENTA. Foluke Adejokun and Jane N. Scott, Department of Anatomy, Wright State School of Medicine, Dayton, Ohio, 45435.

In order to determine the effects of diethylstilbestrol (DES) on the placenta, gravid mice were given either 12.5 µg or 25 µg DES/kg body weight from gestation days 9 through 12 or 16. The animals were sacrificed on gestation days 13 or 17. Control animals received oil injections. The numbers of live fetuses and resorption sites were obtained. Placentas were removed, weighed and measured. The tissues were fixed in Helly's fluid, processed for paraffin sectioning and stained with either H and E or PAS.

By gestation days 13 and 17, fetal resorption was 100% in mice which received 25 µg DES/kg body weight; however, in mice which received 12.5 µg DES/kg body weight, varying degrees of resorption and fetal mortality were observed. Placentas of the DES-treated animals exhibited dose-related decreases in weights and diameters. Similarly, histological alterations in the placentas were observed to be dose-related. At 13 days, some areas showed thinning of the trilaminar trophoblastic placental barrier with apparent decrease of cytoplasm in the germinal trophoblastic cells. By 17 days gestation there was disorganization of the labyrinth characterized by disappearance of fetal blood vessels, increased pyknotic nuclei in the germinal trophoblastic cells, edema, aggregations of leukocytes and macrophages and congested maternal blood spaces. An apparent increase in placental glycogen and degeneration of the glycogen cells was observed in the junctional zone by 17 days. (Supported by Biomedical Research Support Grant, 5-SO7-RRO7155)

9:00 A MODEL FOR TEST REQUEST AND REPORT FORMS FOR THE CLINICAL TOXICOLOGY LABORATORY

Morris L. Seal, MS, MT (ASCP), W. William Spencer, Ph.D.
St. Elizabeth Medical Center
601 Miami Blvd. West
Dayton, Ohio 45408

We present a series of request and report forms currently being used by the clinical toxicology service of a modern 600-bed medical center. The request form was designed using many suggestions from ward clerks, nursing personnel, and physicians. All necessary information for the toxicology staff is available in this one form, including: 1) patient identification, 2) specimen information, 3) pertinent patient signs and symptoms, 4) list of suspected toxic agents and 5) test requested (generic or trade name). The test report forms were designed for readability. Information contained includes: 1) the test result and units, 2) therapeutic range, 3) toxic levels, 4) type of specimen and time of collection and 5) if drug screen, notification that all positive results will be confirmed and a supplementary report issued.

POSTER SESSIONS

9:00 A MICROSCOPIC STUDY OF SURGICALLY RECOVERED DEFECTIVE DURA MATER CARDIAC VALVES. Highison*, G.J., Delmas J. Allen*, L.J.A. DiDio*, L.B. Puig and E.J. Zerbini (*Department of Anatomy, Medical College of Ohio, Toledo, Ohio 43699, and the Department of Surgery, University of Sao Paulo, Sao Paulo, Brazil)

Since early 1971 bioprosthetic cardiac valves constructed of homologous dura mater have been implanted in over 1400 patients. Clinical and hemodynamic evaluations of these patients have revealed no apparent thromboemboli, bacterial endocarditis, or cardiac insufficiency. Early and late valvular incompetency observed mainly in patients with aortic valve replacements were caused by detachment of the valvular leaflet from its supportive stainless steel ring. Often nodular structures were found at the site of detachment as well as elsewhere on the leaflet. The purpose of this study is to describe the structural and chemical changes occurring within aortic dural valves recovered at surgery after various periods of implantation. SEM of the recovered dural valves revealed eroded surfaces of fibrin and tangled free ends of collagen fibers. Fibroblasts, squamous-like lining cells, and macrophages were seen at the light and TEM levels within the irregular fibrin surface and the inner highly compact collagen fiber matrix. Isolated areas of degeneration characterized by a loose random array of deformed collagen fibers, lipid deposits, occasional calcium foci, fibrillar and cellular fragments, and highly vacuolated autophagocytotic fibrocytes were found in the recovered valves. X-ray micro-analysis of nodules present on several valves revealed the presence of calcium, phosphorus, and sulfur in a 3:2:1 ratio. These are indications of a degenerative process and remodeling.

10:00 RARE PLANTS IN THE OAK OPENINGS OF NORTHWESTERN OHIO. Nathan William Easterly, Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

Eleven additional species of rare plants have been observed and documented by the author in his revision of Edwin L. Moseley's "Flora of the Oak Openings" (1928). These species include: Bidens vulgata Greene; Bromus latiglumis (Shear) Hitchc.; Campanula aparinoides Pursh var. uliginosa (Rydb.) Gl., listed as frequent by Moseley; Elymus villosus Muhl.; Habenaria clavellata (Michx.) Spreng.; Leontodon autumnalis L.; Lippia lanceolata Michx., listed as infrequent by Moseley; Lycopus rubellus Moench, listed as frequent by Moseley; Rhexia virginica L.; Sabatia angularis (L.) Pursh; and Strophostyles helvola (L.) Ell.

10:00 EFFECTS OF LOW LEVEL SULFUR DIOXIDE FUMIGATION ON PHOTOSYNTHESIS AND GROWTH IN DUCKWEEDS. *K.V. Loats, R.D. Noble, & B.K. Takemoto. *Department of Biology, Denison University, Granville, Ohio 43023 and Department of Biological Sciences, Bowling Green University, Bowling Green, Ohio 43403.

Following exposure to 0.5ppm and 0.75ppm sulfur dioxide fumigation, for up to two weeks, apparent photosynthesis was determined in Lemna minor, Lemna valdiviana, and Spirodela oligorhiza. Photosynthesis was determined using infrared gas analysis in a closed system at 300ppm, 500ppm, and 1000ppm carbon dioxide concentrations. There was an inhibition of photosynthesis in two of the three species at the lower sulfur dioxide concentration and in all species at the higher sulfur dioxide concentration. The higher carbon dioxide concentrations did not overcome the photosynthetic suppression of the sulfur dioxide. Under control conditions the photosynthetic rates were high relative to other angiosperms, as expressed on a dry weight basis.

Asexual reproduction of the plants during the sulfur dioxide fumigation, as determined by frond count, will also be reported.

10:00 CYSTOGENUS DEVELOPMENT OF *WORONINA PYTHII*. Daniel P. Dylewski and Charles E. Miller. Dept. of Botany, Ohio University, Athens, Ohio 45701.

Woronina pythii Goldie-Smith is an obligate parasite of species of *Pythium*. This holocarpic, endobiotic parasite exhibits cruciform nuclear division and causes hypertrophy of host hyphae. The zoospore encysts on the host mycelium and eventually its amoeboid protoplasmic contents penetrate the host mycelium, developing therein into either sporangiogenus or cystogenus plasmodia. With light microscopic observations, cystogenus and sporangiogenus plasmodia are indistinguishable early in development prior to plasmodial cleavage. Cleavage of mature cystogenus plasmodia into incipient cysts occurs shortly after the plasmodia have attained their maximum size. Resting bodies (cysts) become thick-walled at maturity and are arranged into sori. The size and shape of cystosori are quite variable: subspherical (11-32μ diam.), ovoid (12-20 x 15-30μ), oblong (8-16 x 16-27μ), dumbell-shaped, and linear. Cystosori with 4-10 cysts are commonly found in heavily parasitized cultures. Thick-walled cysts are golden brown at maturity, generally spherically-shaped and loosely associated (internally situated) or polyhedrally-shaped and tightly associated (peripherally situated), and measure 2.7-3.9μ in diameter. Each mature cyst contains one or two nuclei, elongated mitochondria, numerous lipid globules, endoplasmic reticulum, and dense cytoplasm with vacuoles and vesicles. Dried cystosori, upon rehydration liberate zoospores.

1:30 NATURAL HISTORY FOR FUTURE SCIENTISTS. Robert R. Segedi. The Cleveland Museum of Natural History, Wade Oval, University Circle, Cleveland, Ohio 44106.

The Future Scientists Program of the Cleveland Museum of Natural History offers interested and motivated high school students an opportunity for field experience in various disciplines of the natural sciences. Several months are spent studying a particular subject such as archaeology or ornithology. Investigation into the latter subject has focused on raptors (orders Strigiformes and Falconiformes). Included in this effort have been trips to a banding station at Hawk Mountain, Pennsylvania; Point Pelee, Ontario; and frequent banding adventures in Ohio. Certain observations are submitted to current local, national, and international research projects. Museum staff and other specialists prepare presentations and study materials to complement the educational value of field work. Senior students are expected to instruct relative newcomers in fundamentals previously taught. Participants are initiated in accepted procedures for undertaking a scientific field investigation. Emphasis is placed on developing basic skills such as map reading, learning and using an appropriate technical vocabulary, use of field guides and taxonomic keys, care and use of equipment, understanding the need to keep detailed and accurate notes, and, one hopes, an abiding appreciation for natural science.

1:30 DEVELOPMENT OF SELF-STUDY MODULES FOR INSTRUCTION IN RADIATION PROTECTION. Walter E. Carey, Alan D. Evans, and Terry O. Campbell. The Ohio State University, Department of Nuclear Engineering, 206 W. 18th Ave., Columbus, Ohio 43210

A series of self-study, slide-tape, instructional modules covering the basic principles of radiation protection is being developed and produced. The major goals of this series are to provide uniform instruction to students in several departments, to provide mastery of the material through continuous availability to students, and to provide understanding of the basic concepts on which radiation protection standards and practices are based. Module titles are: Nature of Radiation, Detection of Radiation, Biological Effects of Radiation, Radiation Protection Methods, and Decontamination and Waste Disposal. Two of these modules are available in preliminary form for field evaluation and will be presented for review.

Module development and production is being accomplished with a team composed of a content consultant and script writer, an instructional developer, and a production director. Field evaluations, including pre-test and post-test performance of students from diverse backgrounds, as well as storyboard review by both students and potential faculty users, are included in the development process. The project is jointly sponsored by the Local Course Improvement program of the National Science Foundation and the Teaching Aids Laboratory and Nuclear Engineering Program of The Ohio State University.

1:30 A COMPARATIVE STUDY OF PHYTOPLANKTON COMPOSITION AND DIVERSITY IN TROPICAL LAKES AND PONDS OF THE GALAPAGOS ISLANDS AND THE ANDES OF ECUADOR. Miriam Steinitz de Kannan, Department of Zoology, The Ohio State University, Columbus, Ohio 43210.

Nine small high altitude freshwater lakes in the Ecuadorian Andes and five lakes and ponds in the Galapagos Islands were sampled for plankton composition and diversity. There is no seasonality in these lakes. They are oligothermal and polymictic. Most of the species of phytoplankters in these lakes are also found in temperate regions. Species composition is related to water chemistry. Species diversity is a function of the variety of niches available in the shallows and the periphery of the lakes.

2:30 PREY SELECTION BY AN AFRICAN ROBBER FLY, HOPLOSTOMERUS NOBILIS (DIPTERA: ASILIDAE) Gary Bernon, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403

A robber fly was found to forage at cow dung in South Africa. Observations were made over a two year period (1977-1978). Prey selection was evaluated by comparing 150 predator-prey captures to the known abundance of 94% of the prey species. The predator was selective for certain species of dung beetles. Selection was determined primarily by three factors: relative abundance of prey per unit time, relative energy gain per prey species, and relative capturability (defense mechanisms) per prey species. These three factors were combined and used to predict the probability of capture for any prey.

2:30 FOOD PARTITIONING BETWEEN TWO SPECIES OF BENTHIC FISH IN THE BIG DARBY CREEK, OHIO. Dennis Durnwald, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Differential use of invertebrate drift and stream benthos as food resources was examined for two species of darters (Etheostoma caeruleum and E. blennioides) inhabiting the headwaters of the Big Darby Creek, Ohio. In the field fish were allowed to feed for five hours under two conditions: (1) in an undisturbed environment with both drift and benthos available, (2) with drift excluded by a fine mesh net. The objectives were: (1) to determine the importance of drift in the diet of darters, a factor presumed unimportant but never heretofor examined; and (2) to assess differential utilization of drift and benthos between the two species. Quantity and composition of the drift under both conditions were monitored with drift nets 12 inches wide. Stomach contents are being analysed by dry weight to determine an electivity index for each species. Preliminary results indicate that darters use invertebrate drift, but not extensively.

2:30 SEASONAL CHANGES IN ENERGY CONTENT AND C:N RATIOS IN TWO POPULATIONS OF THE SPHAERIID CLAM, MUSCULIUM PARTUMEIUM. Daniel J. Hornbach*, C. M. Way* and Albert J. Burky. University of of Dayton, Dayton, Ohio 45469.

Populations of Musculium partumeium from an ephemeral pond and a permanent pond were analyzed seasonally for energy content. The population from the ephemeral pond exhibits one generation per year with energy content increasing from 2.16 to 91.81 mgC/100 animals of a natural size distribution during spring reproduction. The C:N ratio increases from 2.35 to 5.43 during the period of growth preceding reproduction and then decreases to 4.00. The population from the permanent pond has two generations per year. Energy content of the spring generation increases from 13.35 to 106.11 mgC/100 clams during fall reproduction and from 3.99 to 89.82 mgC/100 animals for the fall generation during spring reproduction. For both generations C:N ratios decreased prior to and increased towards the end of reproduction. Compared to the ephemeral pond, C:N ratios for newborns are higher in the permanent pond. In both populations a decrease in C:N ratios occurs during reproduction due to the utilization of carbon for reproduction. The annual productivity in the permanent pond is 6.40 $mgC/m^2/day$ (3.48 and 2.92 $mgC/m^2/day$ for spring and fall generations respectively) and approximately 7.59 $mgC/m^2/day$ for the ephemeral pond.

*Present address: Dept. of Zoology, Miami University, Oxford, Ohio 45056.

3:30 MORPHOLOGY OF THE PROBOSCIS OF GRACILISENTIS GRACILISENTIS (ACANTHOCEPHALA: NEOECHINORHYNCHIDAE). Reid Jilek and John L. Crites. Department of Zoology and CLEAR, The Ohio State University, Columbus, Ohio 43210.

The proboscis of Gracilisentis gracilisentis Van Cleave, 1913 was originally described as possessing three transverse rows of twelve hooks each. Seventeen percent of 50 G. gracilisentis exhibited variability in hook number and arrangement. The terminal row and middle row of hooks possess 12 or 13 hooks, whereas the basal row possesses 12-14 hooks. The internal anatomy of the proboscis was examined by light microscopy and the external anatomy of the proboscis was examined by scanning electron microscopy. All hooks possess hook sheaths. The terminal and middle rows of hooks possess hook retractor muscles and, along with their hook sheaths are capable of being retracted into the proboscis. The basal row of hooks do not have retractor muscles and remain extended at all times. Hooks of the middle row retract simultaneously, followed by simultaneous retraction of the terminal hooks. Once the hooks of the middle and terminal rows retract, the proboscis begins to introvert into the proboscis receptacle. No apical organ was observed. The body wall surrounding the proboscis receptacle appears reinforced and maintains its circular integrity. (Supported in part by NSF Grant DEB 76-01414).

3:30 STEREOELECTRON MICROSCOPY OF EUSTRONGLIDES TUBIFEX, THE SENSORY PAPILLAE. John L. Crites and Reid Jilek, The Ohio State University and CLEAR, 1735 Neil Avenue, Columbus, Ohio 43210.

Cephalic, lateral and external, caudal papillae of third, fourth and fifth stages of E. tubifex were examined using ordinary light and stereoelectron scanning microscopy. Larval nematodes were removed from mesenteric capsules of Yellow Perch from Lake Erie. Adult stages were removed from experimentally infected Mallards. All stages have 12 cephalic papillae arranged in two circles of six each, two lateral and four submedian. Papillae of inner circle are always smaller than those of outer circle. In all stages examined a single row of lateral-papillae extend from median members of the outer circle to posterior end. All papillae are surrounded by a circular ring-form depression in cuticle. In third-stage larvae cephlic papillae of inner circle have a donut shaped base and cone shaped, almost spine-like, central projection. In fourth stages, a papilliform central core raises from the basal ring and the cone extends from its apex. In adults papillae of inner circle swell from basal ring, with cone at apex. Papillae of outer circle in third-stage larvae protrude very slightly, there is no cone or spine. In fourth-stage larvae there is a definite elevated band, a mound shaped core with crenulated surface extending outward from basal band. In adults crenulated core mushrooms out over basal band and may develop a central cone at apex. The lateral papillae, circular with depressed outer ring. In males, extend over the bursa. (Supported in part by NSF Grant DEB 76-01414 and FWS Grant F-48-R).

3:30 THE EFFECT OF HEXAVALENT CHROMIUM EXPOSURE ON RAINBOW TROUT (SALMO GAIRDNERI) BRAIN NA/K-ATPASE. Robert B. Shabanowitz and Robert M. Stokes. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Brain Na/K-ATPase activities were examined in rainbow trout (Salmo gairdneri) during exposure to 2.5mg/l hexavalent chromium as the dichromate ion. Na/K-ATPase activity in the fish was determined at 0, 24, 72, 120 and 192 hours exposure to hexavalent chromium. Statistical analysis indicated a significant decrease in Na/K-ATPase activity from 0 hours to 24 hours with a subsequent steady recovery in activity from 24 hours to 192 hours. At 192 hours, the Na/K-ATPase activity was within the control range.